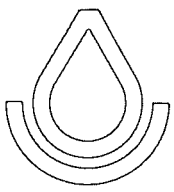
SOIL SURVEY OF

Eau Claire County, Wisconsin



United States Department of Agriculture
Soil Conservation Service
In cooperation with
Research Division of the
College of Agricultural and Life Sciences
University of Wisconsin

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all who need the information, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1967–73. Soil names and descriptions were approved in 1974. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1974. This survey was made cooperatively by the Soil Conservation Service and the Research Division of the College of Agricultural and Life Sciences, University of Wisconsin. It is part of the technical assistance furnished to the Eau Claire County Soil and Water Conservation District.

HOW TO USE THIS SOIL SURVEY

THIS SURVEY contains information that can be applied in managing farms, woodlands, and wildlife areas; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

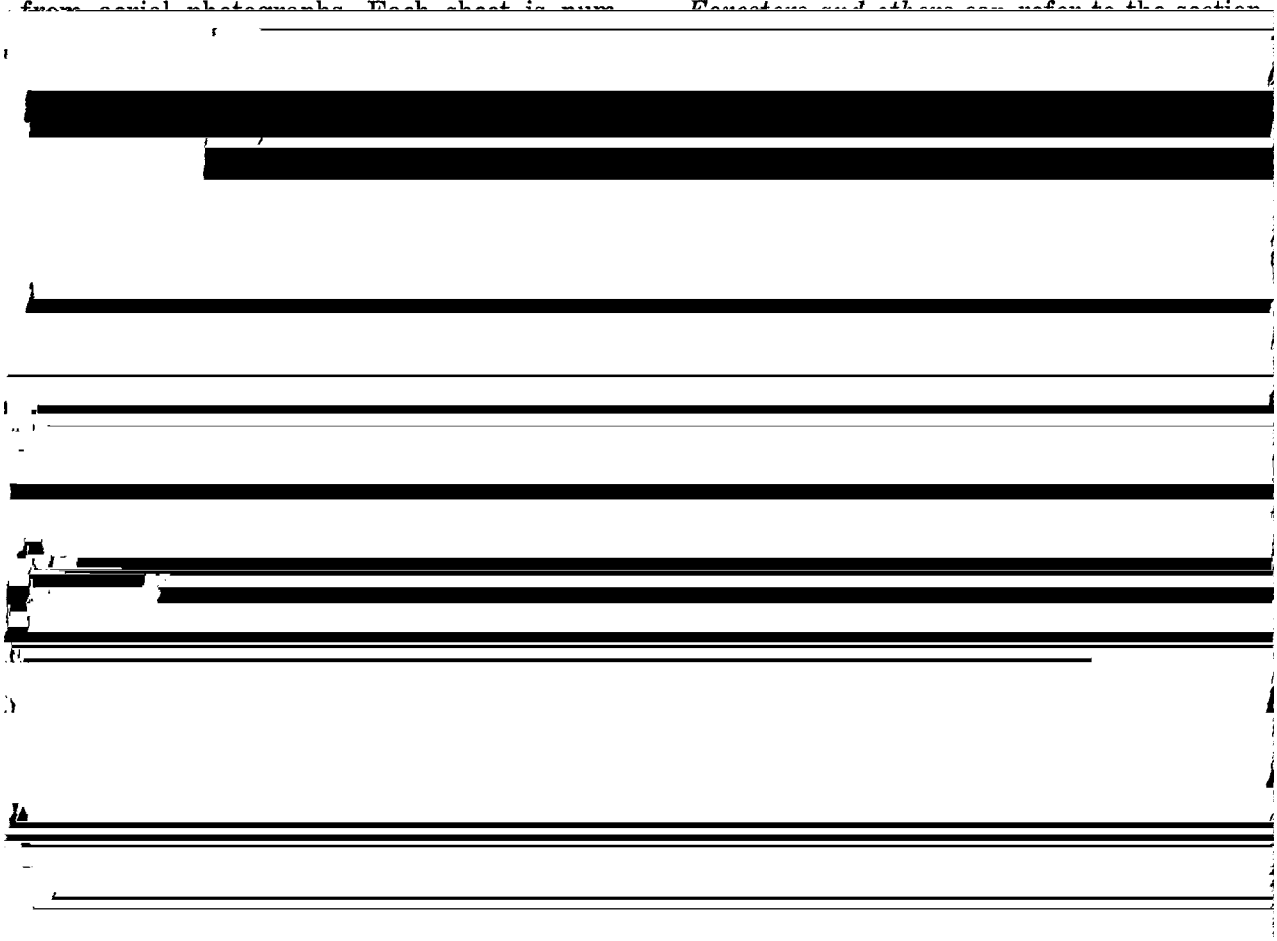
Locating Soils

All the soils of Eau Claire County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is num-

text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the capability units and woodland suitability groups.

Foresters and others can refer to the section



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SOIL SURVEY OF EAU CLAIRE COUNTY, WISCONSIN

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UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE RESEARCH DIVISION OF THE COLLEGE OF AGRICULTURAL AND LIFE SCIENCES, UNIVERSITY OF WISCONSIN

EAU CLAIRE COUNTY is in the west-central part of Wisconsin (fig. 1). It is bordered on the south by Trempealeau, Buffalo, and Jackson Counties; on the west by Dunn and Pepin Counties; on the north by Chippewa County; and on the east by Clark County. The county extends about 36 miles from east to west [illegible] miles from north to south. The total [illegible] forests. Small lumbering operations began in the county. It is the French interpretation of the Indian name for clear water.

When Eau Claire County was created by an act of the State legislature in October 1856, the lumbering industry was in its initial stages. The northern and eastern parts of the county were covered with pine

retreat. Areas near the many lakes and streams are becoming increasingly important as homesites and recreational areas. Wooded tracts throughout the county are also in demand for these uses. As a result, local and state ordinances involving land use zoning are

that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other important feature near the place where a soil of that series was first observed and mapped. Gale and Seaton, for example, are the names

given descriptive names, such as "Alluvial land, sandy," which is a land type in Eau Claire County.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soil in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field and plot experiments

meet this need. Still another difference is the pattern of occurrence of the major soils or the range in scope that is permitted within associations in different surveys. One such difference is in the general soil map of the published soil survey of Dunn County which shows an area of Alluvial land, wet, and Boaz soils extending to the Eau Claire County line. Boaz soils are not present in Eau Claire County, however, and the areas of

are growing cash crops, dairying, and raising beef cattle. The major soils in this association have moderate potential for crops commonly grown in the county.

The major soils in this association are shallow or moderately deep to sandstone bedrock, and many are sloping to steep; thus, they have moderate or severe limitations for homesites, septic tank absorption fields, local roads and streets, and sanitary landfills.

2. Seaton-Gale-Urne Association

Well drained and somewhat excessively drained silt loams and very fine sandy loams that are underlain by loamy and sandy material and sandstone; on uplands

This association consists of nearly level to very steep ridges and valleys that have well established drainage patterns (fig. 2). The ridgetops are narrow, mostly less than one-quarter of a mile in width. Most of the valleys are long and are narrow at the heads, but widen to as much as three-quarters of a mile at the valley outlets. The ridgetops are mainly 200 to 400 feet above the valley floors. Gently sloping areas have medium slopes, and steep areas have mostly short slopes.

This association makes up about 15 percent of the county. It is about 40 percent Seaton soils, 24 percent Gale soils, 9 percent Urne soils, and 27 percent minor soils.

Seaton soils are nearly level to steep and are mostly well drained. In some areas Seaton soils are moderately well drained. These soils are on ridgetops and side slopes along with Gale soils in the smoother areas of the county. Seaton soils are at a lower elevation than nearby Urne soils. The surface layer typically is dark grayish brown silt loam about 8 inches thick. The subsoil is yellowish brown and dark yellowish brown silt loam and heavy silt loam about 32 inches thick. Below the subsoil to a depth of about 60 inches is yellowish brown silt loam.

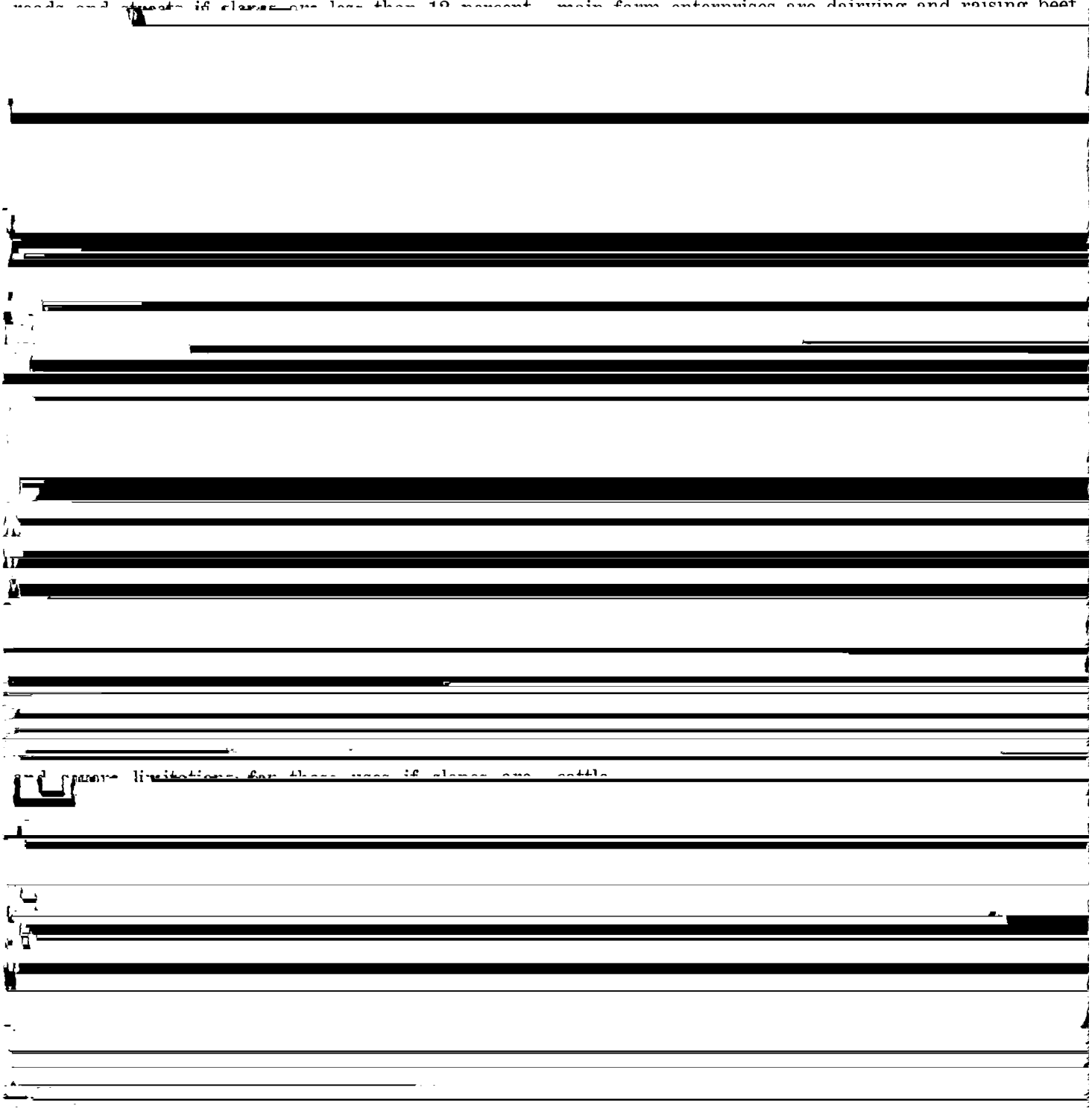
Gale soils are gently sloping to steep and are well drained. These soils are on ridgetops and side slopes along with Seaton soils in the smoother areas of the county. The ridges on which Gale soils occur are mostly narrower and more sharply defined than those on which Seaton soils occur. The surface layer typically is very dark grayish brown silt loam about 7 inches thick. The subsoil is about 24 inches thick. It is brown and dark yellowish brown silt loam in the

***Figure 2.*—Typical landscape of Seaton, Gale, and Urne soils in soil association 2. Areas where slopes are steep are kept in hay or pasture plants.**

Figure 3.—**Large park for mobile homes on sandy soils east of the city of Eau Claire, Menahga-Plainfield association (association 3).**

Seaton soils are nearly level and gently sloping and thick. It is yellowish brown silt loam in the upper

homesites, septic tank absorption fields, and local roads and streets if slopes are less than 12 percent and areas are used for corn, small grain, and hay. The main farm enterprises are dairying and raising beef



and some limitations for these uses if slopes are cattle

more than 12 percent. They have slight limitations for sanitary landfills if slopes are less than 12 percent and moderate limitations for this use if slopes are more than 12 percent. Tell soils have slight limitations for homesites and septic tank absorption fields, moderate limitations for local roads and streets, and severe limitations for sanitary landfills.

The major soils in this association have mainly severe limitations for homesites (fig. 4), septic tank absorption fields, sanitary landfills, and local roads and streets.

6. Ludington-Elm Lake-Fairchild Association

60 inches is very pale brown and olive layers of sandstone and shale.

Elm Lake soils are nearly level and are poorly drained. These soils are in depressions and along drainageways between upland ridges. The surface layer typically is black loamy sand about 1 inch thick. The substratum to a depth of about 60 inches is brown, grayish brown, and pale brown, mottled loamy sand and sand in the upper part and gray loam and light gray, very pale brown, and brownish yellow sandstone in the lower part.

Fairchild soils are nearly level and gently sloping [redacted]

Billett soils are nearly level to moderately steep. They are well drained and moderately well drained. These soils are mainly on the higher stream terraces and on foot slopes adjacent to the uplands. The surface layer typically is very dark grayish brown sandy loam about 8 inches thick. The subsoil is about 26 inches thick. It is dark brown sandy loam in the upper part, dark yellowish brown heavy sandy loam in the middle, and yellowish brown sandy loam in the lower part. Below this to a depth of about 60 inches is yellowish brown fine and medium sand.

Meridian soils are nearly level to sloping and are [redacted]

[redacted]

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Mapping unit	Acres	Percent
Adrian muck	4,800	1.2
Alluvial land, sandy	4,750	1.1
Alluvial land, wet	11,100	2.7
Arenzville silt loam, 0 to 3 percent slopes	4,550	1.1
Arland sandy loam, 2 to 6 percent slopes	440	.1
Arland sandy loam, 6 to 12 percent slopes, eroded	1,400	.3
Arland sandy loam, 12 to 20 percent slopes, eroded	620	.2
Au Gres loamy sand	2,900	.7
Billett sandy loam, 1 to 6 percent slopes	11,900	2.9
Billett sandy loam, 6 to 12 percent slopes, eroded	4,050	1.0
Billett sandy loam, 12 to 20 percent slopes, eroded	1,350	.3
Billett sandy loam, moderately well drained, 0 to 3 percent slopes	1,750	.4
Boone-Plainbo complex, 2 to 6 percent slopes	1,700	.4
Boone-Plainbo complex, 6 to 12 percent slopes	4,100	1.0
Boone-Plainbo complex, 12 to 45 percent slopes	8,800	2.1
Burkhardt sandy loam, 0 to 3 percent slopes	330	.1
Cable loam	5,200	1.3
Caryville loam, 0 to 3 percent slopes	1,100	.3
Chetek sandy loam, 1 to 6 percent slopes	570	.1
Chetek sandy loam, 6 to 12 percent slopes, eroded	870	.2
Chetek sandy loam, 12 to 20 percent slopes, eroded	680	.2
Curran silt loam	2,950	.7
Dakota loam, 0 to 3 percent slopes	260	.1
Dells silt loam	1,200	.3
Dunnville sandy loam, 0 to 3 percent slopes	960	.2
Eleva sandy loam, 2 to 6 percent slopes	5,100	1.2
Eleva sandy loam, 6 to 12 percent slopes, eroded	5,500	1.3
Eleva sandy loam, 12 to 20 percent slopes, eroded	2,550	.6
Elkmound loam, 2 to 6 percent slopes	3,100	.7
Elkmound loam, 6 to 12 percent slopes, eroded	4,500	1.1
Elkmound loam, 12 to 20 percent slopes, eroded	11,500	2.8
Elkmound loam, 20 to 45 percent slopes	13,800	3.4
Elm Lake loamy sand	13,300	3.3
Ettrick silt loam	1,750	.4
Fairchild and Merrillan soils, 0 to 2 percent slopes	3,250	.8
Fairchild and Merrillan soils, 2 to 6 percent slopes	9,500	2.3
Fallcreek sandy loam, 0 to 2 percent slopes	1,000	.2
Fallcreek sandy loam, 2 to 6 percent slopes	7,200	1.7
Ludington and Humbird soils, 6 to 12 percent slopes	9,200	2.2
Markey muck	1,350	.3
Marshan loam	580	.1
Menahga sand, 1 to 6 percent slopes	41,600	10.1
Menahga sand, 6 to 12 percent slopes	2,050	.5
Meridian loam, 0 to 2 percent slopes	2,000	.5
Meridian loam, 2 to 6 percent slopes	5,100	1.2
Meridian loam, 6 to 12 percent slopes, eroded	1,550	.4
Meridian loam, moderately well drained, 0 to 3 percent slopes	870	.2
Morocco loamy sand	1,800	.4
Mt. Carroll silt loam, 2 to 6 percent slopes	1,950	.5
Mt. Carroll silt loam, 6 to 12 percent slopes, eroded	820	.2
Mt. Carroll silt loam, benches	500	.1
Newson loamy sand	7,800	1.9
Norden silt loam, 6 to 12 percent slopes, eroded	385	.1
Norden silt loam, 12 to 20 percent slopes, eroded	580	.1
Norden silt loam, 20 to 30 percent slopes, eroded	1,600	.4
Northfield silt loam, 2 to 6 percent slopes	3,350	.8
Northfield silt loam, 6 to 12 percent slopes, eroded	2,550	.6
Northfield silt loam, 12 to 20 percent slopes, eroded	2,600	.6
Northfield silt loam, 20 to 30 percent slopes, eroded	2,950	.7
Northfield silt loam, 30 to 45 percent slopes	1,900	.5
Orion silt loam	2,600	.6
Otter silt loam, overwash	1,600	.4
Otterholt silt loam, 2 to 6 percent slopes	890	.2
Otterholt silt loam, 6 to 12 percent slopes, eroded	920	.2
Pillot silt loam, 2 to 6 percent slopes	350	.1
Plainbo loamy sand, 2 to 6 percent slopes	3,250	.8
Plainbo loamy sand, 6 to 12 percent slopes, eroded	5,000	1.2
Plainfield loamy sand, 1 to 6 percent slopes	24,600	6.0
Plainfield loamy sand, 6 to 12 percent slopes, eroded	6,000	1.4
Plainfield loamy sand, loamy substratum, 1 to 6 percent slopes	4,350	1.1
Plainfield loamy sand, loamy substratum, 6 to 12 percent slopes, eroded	830	.2
Riverwash	520	.1
Seaton silt loam, 2 to 6 percent slopes	4,800	1.2
Seaton silt loam, 6 to 12 percent slopes, eroded	12,100	3.0

If adequately drained and protected from soil blowing, this soil is suited to forage crops, sod, and specialized cash and truck crops. Capability unit IVw–7; woodland suitability group 3w3; wildlife group 8; recreation group 8.

Alluvial Land

Ae—Alluvial land, sandy (0 to 2 percent slopes). This nearly level, excessively drained land type consists of stratified alluvium that is sand or loamy sand throughout. It is on flood plains. Most areas are long and narrow and range from 2 to 80 acres in size. Vegetation is a sparse cover of drought tolerant plants.

Included with this land type in mapping are small areas of Alluvial land, wet, and small areas of Riverwash.

Available water capacity is very low in this land type, and natural fertility is low. Permeability is rapid. Runoff is slow, and the erosion hazard is slight. This land type is subject to frequent flooding, and in places additional sand is deposited on the surface during major floods. In places enough sand is deposited to kill the vegetation. The water table is at or near the surface for short periods when the level of the stream is high, but it recedes rapidly as the stream level returns to normal. Management practices are needed to maintain plant cover and reduce the amount of damage caused by overflow.

This land type is used mainly for wildlife habitat and for recreational purposes. It has severe limitations for nonfarm uses. Capability unit VIIs–9; woodland suitability group 3s1; wildlife group 3; recreation group 7.

Af—Alluvial land, wet (0 to 2 percent slopes). This nearly level, poorly drained land type consists of alluvial, silty soils in major drainageways. Native vegetation is mainly elm, red maple, cottonwood, and black willow.

In a representative profile the surface layer is dark grayish brown silt loam about 8 inches thick. Below this is dark grayish brown silt loam that is about 20 inches thick and has very dark grayish brown and brown strata throughout. An older, buried soil is at a depth of about 28 inches. The buried surface layer is black silt loam about 11 inches thick. The substratum to a depth of about 60 inches is brown, mottled silt loam.

Permeability is moderate in these soils. Available water capacity is very high, and natural fertility is high. During wet periods some areas of these soils are saturated at a depth of 3 to 5 feet.

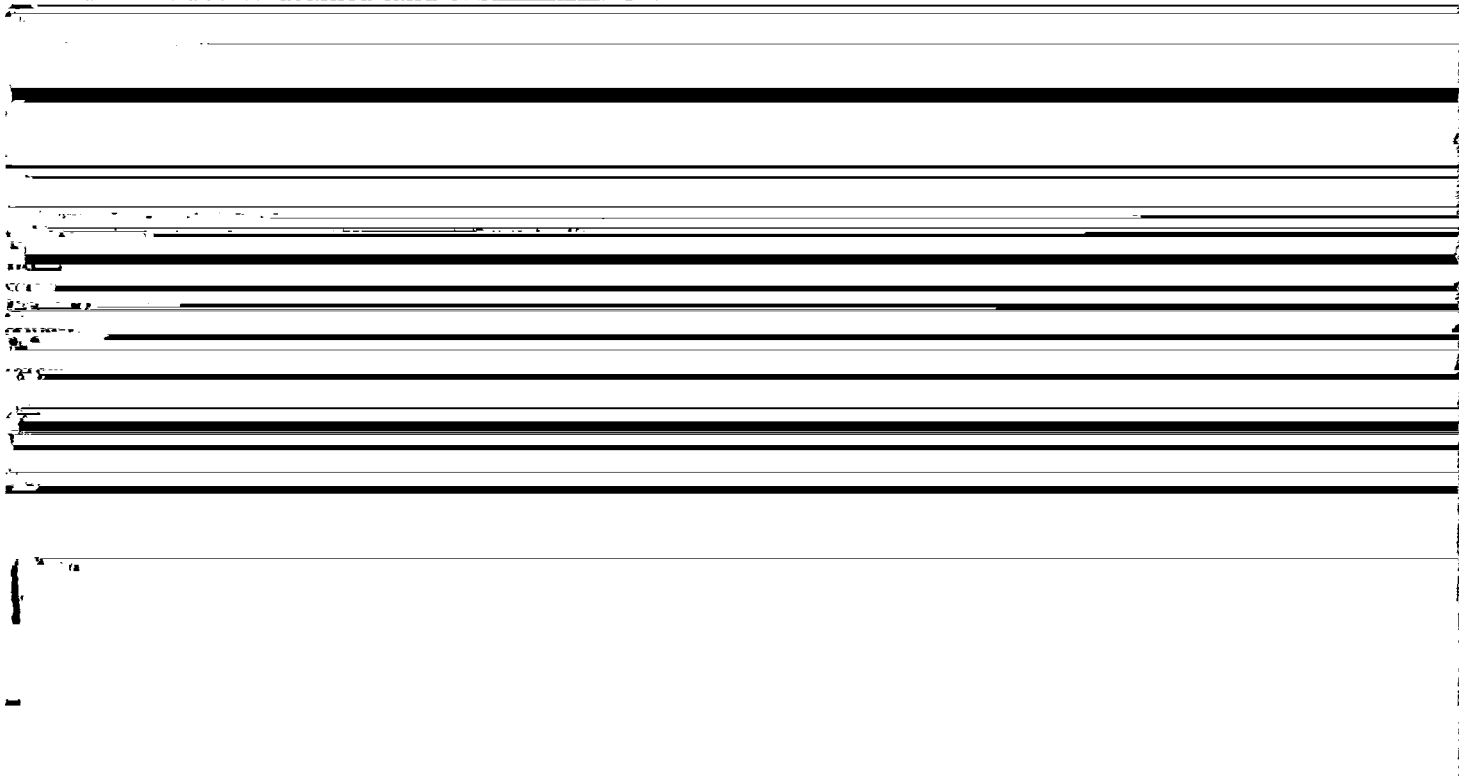
Most areas of these soils are used for cultivated crops and pasture. Arenzville soils are well suited to grasses and are suited to crops if protection from seasonal flooding is provided. They are also suited to open land wildlife habitat and woodland. Limitations for nonfarm uses are moderate to severe.

Representative profile of Arenzville silt loam, 0 to 3 percent slopes, in a cultivated field, 200 feet north and 100 feet west of the southeast corner of sec. 11, T. 26 N., R. 8 W.:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; weak fine subangular blocky structure; friable; medium acid; abrupt smooth boundary.

C1—8 to 28 inches; dark grayish brown (10YR 4/2) silt loam, thin strata of very dark grayish brown (10YR 3/2) and brown (10YR 5/3) silt loam; weak medium platy structure; friable; medium acid; abrupt smooth boundary.

Ab—28 to 39 inches; black (10YR 2/1) silt loam; weak medium granular structure; friable; medium acid; clear smooth boundary.



commonly grown in the county. This soil has moderate

AtB—Arland sandy loam, 2 to 6 percent slopes. This

ity unit IIw–11; woodland suitability group 2o1; wildlife group 9; recreation group 7.

Arland Series

The Arland series consists of well drained, gently sloping to moderately steep, loamy soils on uplands. These soils formed in glacial material and residuum derived from sandstone. Native vegetation is mainly

elongated shapes and range from 2 to 40 acres in size. This soil has a profile similar to the one described as representative for the series, but the surface layer is slightly thicker.

Included with this soil in mapping are small areas of a soil that has a surface layer of loam and areas of a soil that is underlain by hard sandstone.

Runoff is slow, and the erosion hazard is slight. Low available water capacity limits crop yields during

vated crops commonly grown in the county. It has severe limitations for most nonfarm uses. Capability unit IVe–7; woodland suitability group 2r1; wildlife group 1; recreation group 2.

Au Gres Series

The Au Gres series consists of somewhat poorly drained, nearly level, sandy soils on stream terraces and outwash plains. Native vegetation is pine and hardwood forest.

In a representative profile (fig. 5) the surface layer is black loamy sand about 2 inches thick. The subsurface layer is pinkish gray sand about 12 inches thick. The subsoil is about 11 inches thick and is mottled throughout. The upper 6 inches is dark reddish brown and dark brown sand, and the lower 5 inches is dark yellowish brown sand. Below the subsoil to a depth of about 60 inches is light brownish gray sand.

Available water capacity is very low in these soils, and natural fertility is low. Permeability is rapid. In undrained areas these soils are saturated at a depth of 1 to 3 feet during wet periods.

Nearly all areas of Au Gres soils are wooded. Pine, aspen, and scrub oak are in the wooded areas. If adequately drained, these soils can be used for cultivated crops. They are suited to such trees as aspen, white and jack pine, and white and black spruce. Limitations for many nonfarm uses are moderate or severe.

Representative profile of Au Gres loamy sand that has 0 to 2 percent slopes, in a wooded area 1,000 feet

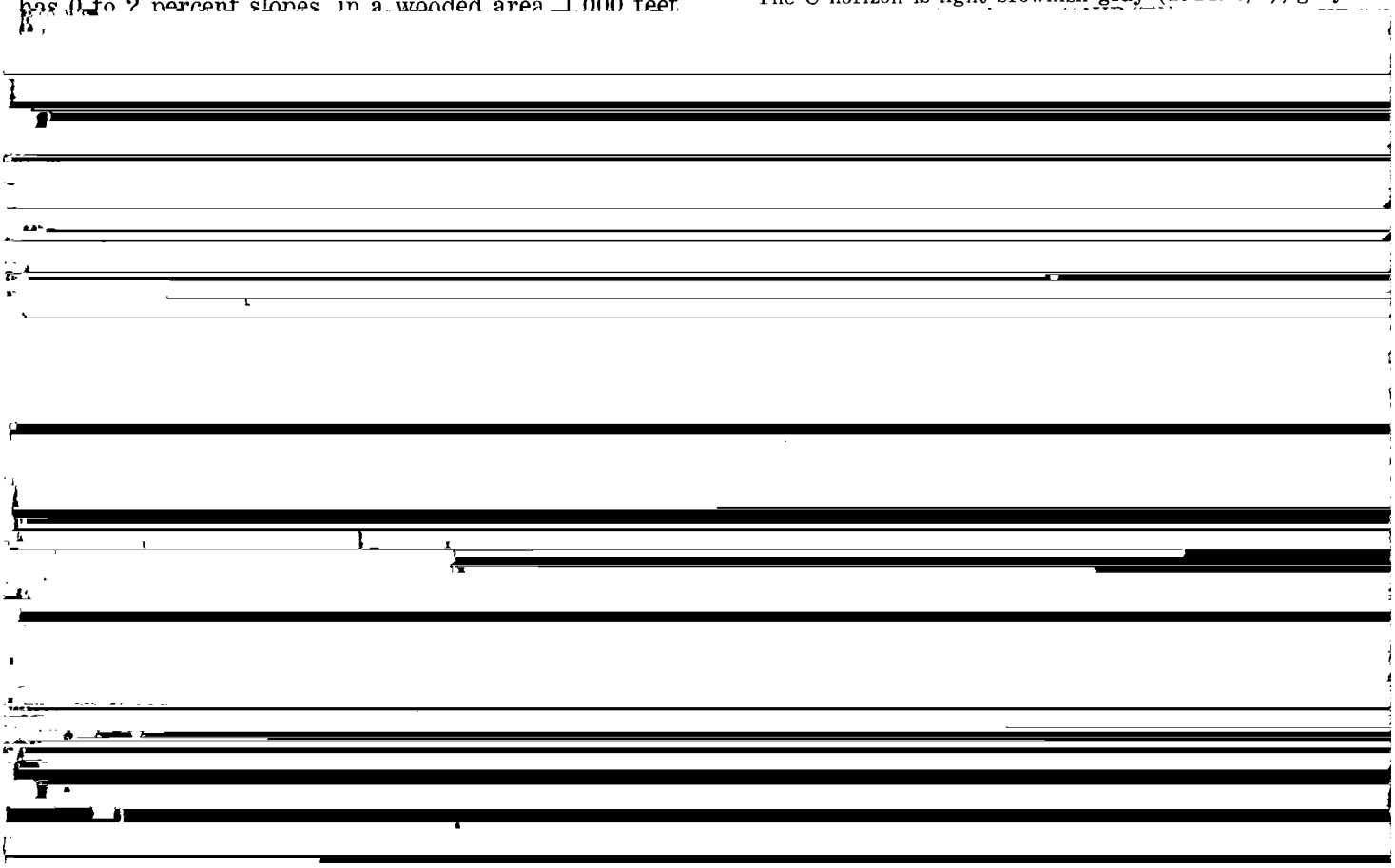


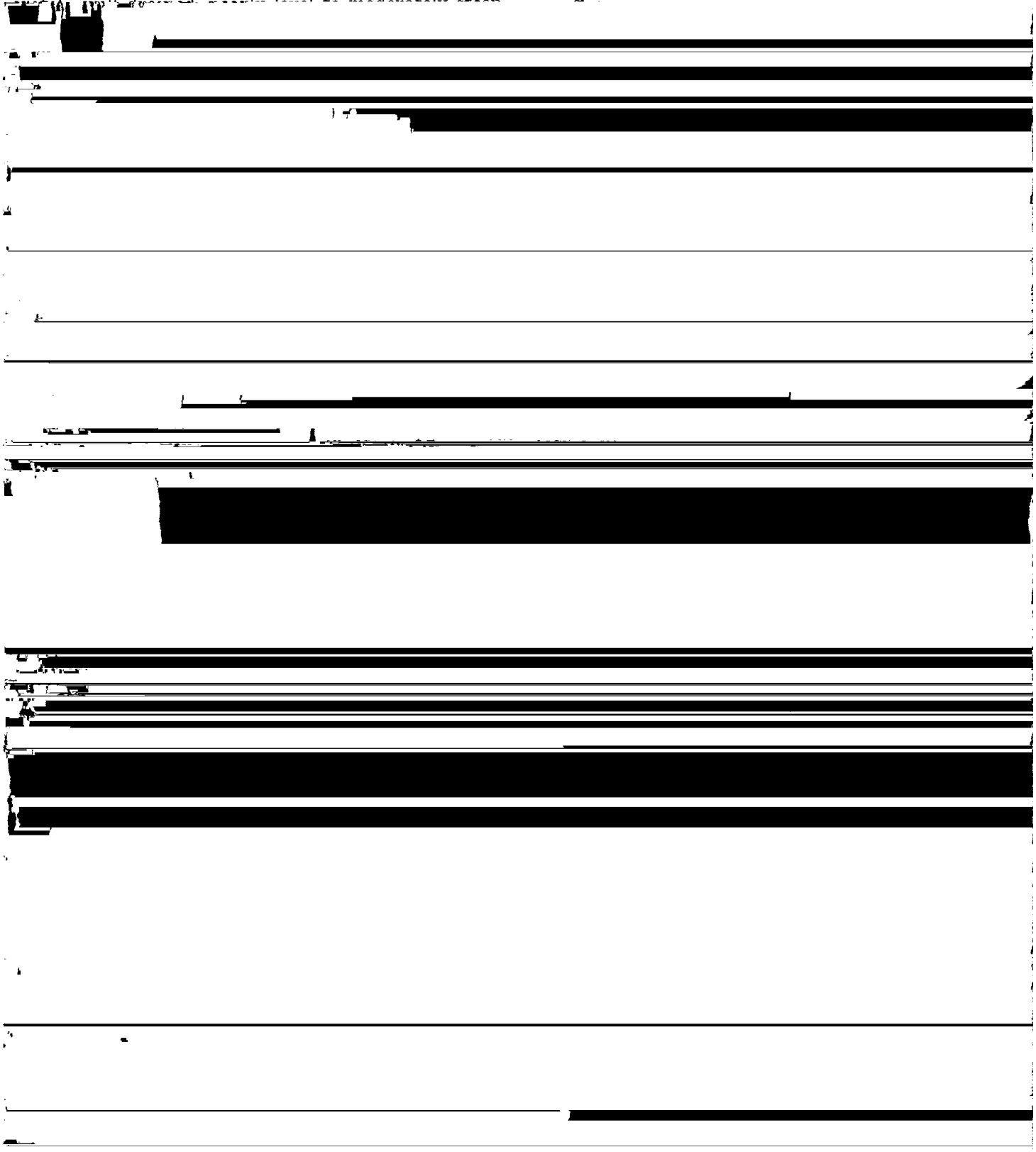
Figure 5.—**Profile of Au Gres loamy sand. The leached subsurface is pinkish gray; the subsoil, which contains iron and humus, is in shades of brown.**

The C horizon is light brownish gray (10YR 6/2), grayish

Billett Series

The Billett series consists of well drained and mod-

available water capacity limits crop yields during most years. Management practices are needed to supply organic matter, conserve moisture, and reduce



on broad stream terraces and outwash plains. Some small, irregularly shaped areas are at the base of sandstone uplands. Most areas range from 4 to 60 acres in size. This soil has a profile similar to the one

C3—26 to 60 inches; very pale brown (10YR 8/4) and strong brown (7.5YR 5/8) weakly cemented sandstone bedrock; strongly acid.

Sandstone bedrock is at a depth of 20 to 40 inches

Most areas of this complex are wooded. A few small areas that were used for crops are now used mainly for pasture. Many open areas are planted to pine trees. These soils are unsuited to crops and are better maintained in permanent vegetative cover. They have moderate or severe limitations for most nonfarm uses. Capability unit VIIs–9; woodland suitability group 3s1; wildlife group 3; recreation group 4.

BoE—Boone-Plainbo complex, 12 to 45 percent

Representative profile of Burkhardt sandy loam, 0 to 3 percent slopes, in a cultivated field, 600 feet south and 50 feet west of the northeast corner of the SE¼ sec. 7, T. 26 N., R. 10 W.:

Ap—0 to 10 inches; very dark brown (10YR 2/2) sandy loam; weak fine subangular blocky structure; friable; strongly acid; abrupt smooth boundary.

B2t—10 to 16 inches; dark brown (7.5YR 4/4) sandy loam; weak medium subangular blocky structure; friable; clay bridging between sand grains; medium

Available water capacity is moderate in these soils, and natural fertility is medium. Permeability is moderate. In undrained areas ground water is at or near the surface throughout the year.

Most areas of these soils are in permanent grasses and are used for pasture or wildlife habitat. A few small areas have been drained and are used for crops. If adequately drained, this soil is suited to small

damage. Surface drainage removes excess water rapidly. Both deep ditches and tile drains are used for internal drainage.

Most areas of this soil are in marsh grass, water tolerant shrubs, or trees and are used for permanent pasture. A few small areas are drained and used for

of Arenzville and Dunnville soils. Also included are

Ap horizon. The B horizon generally is heavy sandy loam

Curran Series

The Curran series consists of somewhat poorly

(7.5YR 4/4) mottles and many medium distinct strong brown (7.5YR 5/6) mottles; massive; friable; strongly acid; clear smooth boundary.

IIC—60 to 72 inches; grayish brown (10YR 5/2) stratified

Representative profile of Dakota loam, 0 to 3 percent slopes, in a cultivated field, 800 feet south and 50 feet east of the center of sec. 2, T. 27 N., R. 10 W.:

Ap—0 to 10 inches; very dark brown (10YR 2/2) loam;

Most areas of these soils are used for crops. A few small areas are in pasture or woods. These soils are suited to farming if adequately drained. They are also suited to woodland and can be used for wildlife habi-

grown in the county. It has severe limitations for most nonfarm uses. Capability unit IIw–5; woodland suitability group 3o2; wildlife group 6; recreation group 5.

Dunnville Series

The Dunnville series consists of well drained, nearly level and gently sloping, loamy soils underlain by [illegible]. These soils are on stream terraces and outwash

Nearly all areas of this soil are used for crops. This soil is moderately well suited to all crops commonly grown in the county. It has slight or moderate limitations for many nonfarm uses. Capability unit IIIs–4; woodland suitability group 3o1; wildlife group 1; recreation group 2.

Eleva Series

The Eleva series consist of well drained or some

texture and less clay in the B horizon than Hixton soils, and they have a finer texture and more clay than Plainbo soils.

E1B—Eleva sandy loam, 2 to 6 percent slopes. This gently sloping soil is on narrow ridgetops on sandstone uplands. Most areas are long and narrow and range from 6 to 60 acres in size. This soil has a profile similar to the one described as representative for the series, but it has a slightly thicker surface layer and is deeper to sandstone.

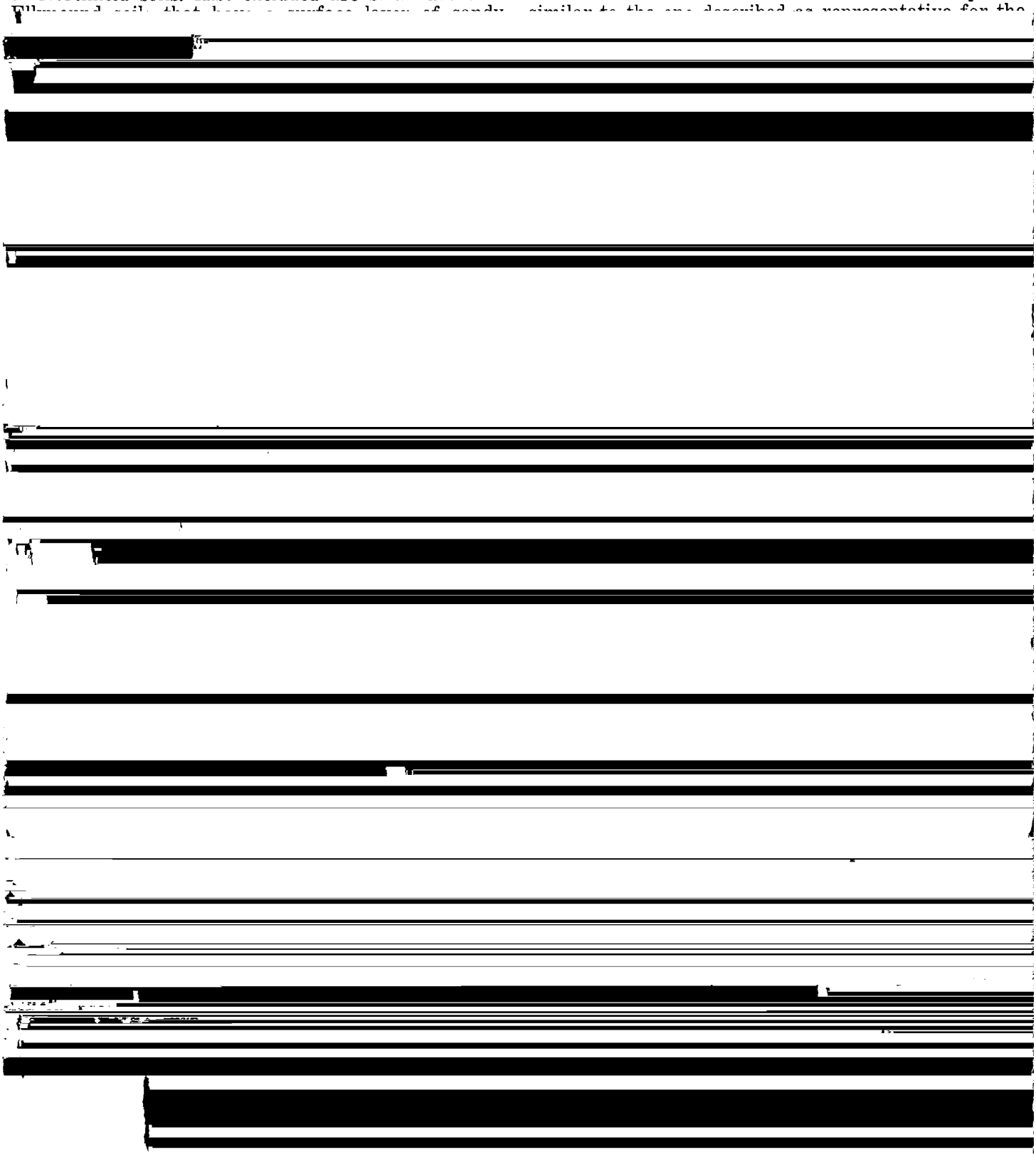
Included with this soil in mapping are small areas of [illegible] soils.

and soil blowing, reduce runoff, conserve moisture, and supply regular additions of organic matter.

Some areas of this soil are used for crops, and many areas are used for pasture or woodland. This soil is not well suited to cultivated crops; it is better suited to hay and pasture. It has moderate or severe limitations for many nonfarm uses. Capability unit IVe–7; woodland suitability group 3r1; wildlife group 1; recreation group 2.

Elkmound Series

of Northfield soils. Also included are small areas of [redacted] from 10 to 200 acres in size. This soil has a profile [redacted]



brown (1.5YR 5/8) mottles; massive; firm; very strongly acid; clear smooth boundary.

IIC5—36 to 60 inches; light gray (10YR 7/2), very pale brown (10YR 7/3), and brownish yellow (10YR 6/6) soft sandstone; medium acid.

Thickness of the solum and depth to sandstone range from 30 to 50 inches. The A1 horizon is black (10YR 2/1) or very dark grayish brown (10YR 3/2) and ranges from 1 to 6 inches in thickness. It is generally sand, loamy sand,

many areas are in native grasses and shrubs. Ettrick soils are suited to crops if excess water is removed. If they are drained, they are well suited to open land wildlife habitat. These soils are poorly suited to woodland. Limitations for nonfarm uses are severe.

Representative profile of Ettrick silt loam that has 0 to 2 percent slopes, in a cultivated field, 850 feet south and 800 feet east of the northwest corner of the SW¼

uplands. These soils are underlain by sandstone and shale bedrock at a depth of 20 to 40 inches. Native vegetation is oak, aspen, and white birch.

In a representative profile the surface layer is black

inches thick. In places the A2 horizon is missing because it has been mixed into the Ap horizon. The B21hir horizon is dark reddish brown (5YR 3/4) or dark brown (7.5YR 3/2) loamy sand or loamy fine sand and ranges from 6 to 13

Fallcreek Series

The Fallcreek series consists of somewhat poorly drained, nearly level and gently sloping, loamy soils on glacial till plains. Native vegetation is hardwood trees.

In a representative profile the surface layer is dark grayish brown sandy loam about 8 inches thick. The subsurface layer is about 8 inches thick. It is brown, mottled sandy loam in the upper part and grayish brown, mottled sandy loam in the lower part. The subsoil is about 26 inches thick. It is pale brown, mottled loam in the upper part and reddish brown, mottled loam in the lower part. The substratum to a depth of about 60 inches is reddish brown, mottled loam.

Available water capacity is high in these soils, and natural fertility is medium. Permeability is moderately rapid in the upper part of the soil and moderately slow in the lower part. In undrained areas, these soils are saturated at a depth of 1 to 3 feet during wet periods.

Some areas of these soils are used for crops and pasture. Other areas are used for woodland and wildlife habitat. Fallcreek soils are suited to farming if excess water is removed and erosion is controlled. They are also suited to woodland and wildlife habitat. Limitations for many nonfarm uses are severe.

Representative profile of Fallcreek sandy loam, 2 to [illegible] percent slopes, in a cultivated area, 850 feet north

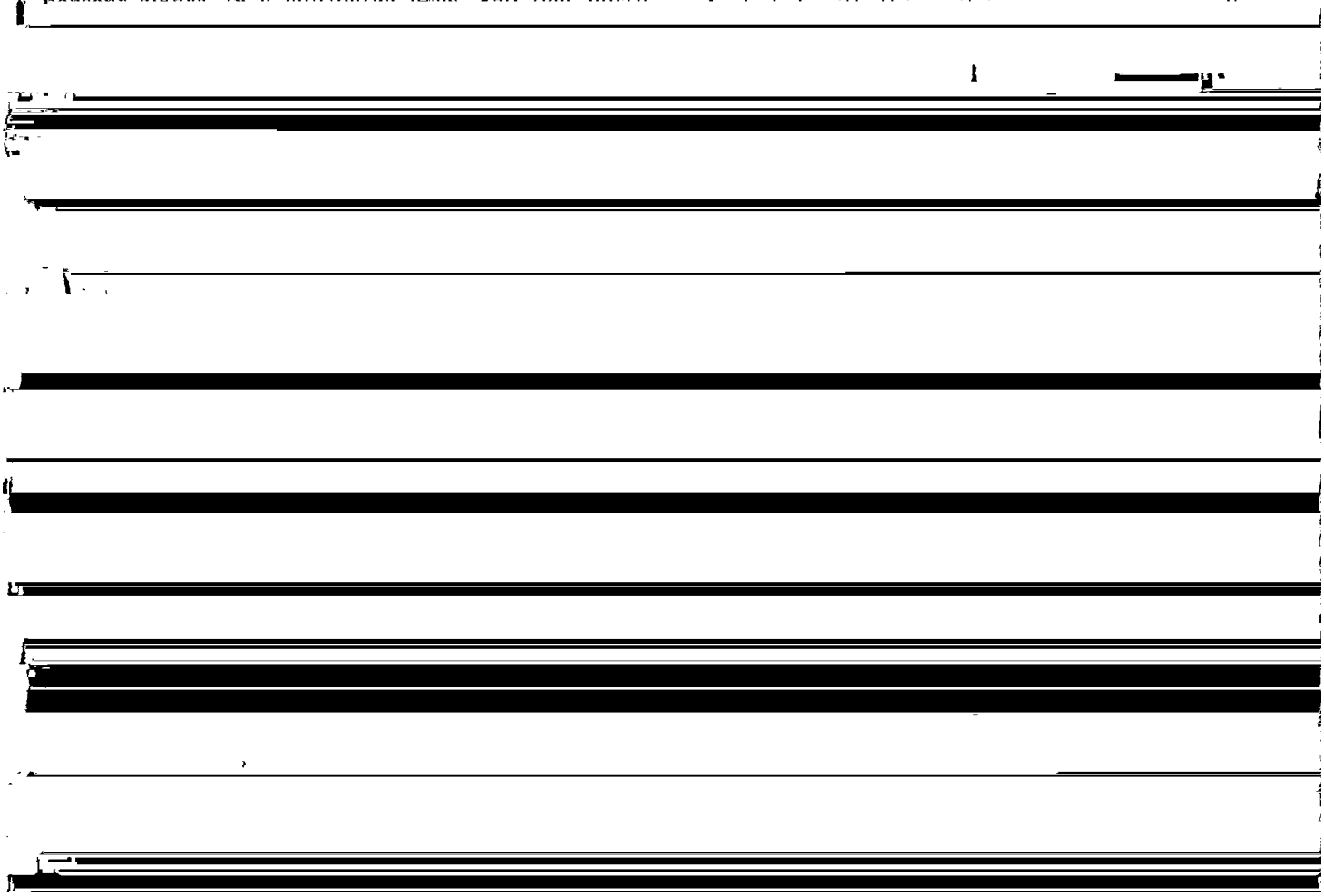
ture parting to weak medium subangular blocky; friable; few thin discontinuous clay films on ped faces; thin very fine sand and silt coatings on prism faces; few to many pebbles; very strongly acid; gradual smooth boundary.

C—42 to 60 inches; reddish brown (5YR 4/4) loam; few medium faint dark brown (7.5YR 4/4) mottles; weak very thick platy structure in upper part, becoming massive in lower part; firm; few to many pebbles; slightly acid.

Thickness of the solum ranges from 30 to 48 inches. The upper part of the solum is sandy loam and ranges from 10 to 24 inches in thickness. In places the A1, Ap, and A2g horizons are loam. In uncultivated areas, the A1 horizon ranges from 2 to 4 inches in thickness and is black (10YR 2/1), very dark gray (10YR 3/1), or very dark grayish brown (10YR 3/2). The A2 horizon is brown (10YR 5/3), grayish brown (10YR 5/2), or pale brown (10YR 6/3). The B2t horizon is loam, sandy clay loam, or light clay loam. The B3 and C horizons are loam, heavy sandy loam, or sandy clay loam.

Fallcreek soils are near Fallcreek variant soils. Fallcreek soils are somewhat poorly drained, and Fallcreek variant soils are moderately well drained.

FoA—Fallcreek sandy loam, 0 to 2 percent slopes. This nearly level soil is in depressions on glacial till plains. Most areas are irregularly shaped and range from 20 to 100 acres in size. This soil has a profile similar to the one described as representative for the series, but the surface layer in this soil is thicker than the one in the representative profile.



are needed to remove excess water, maintain organic matter content, and control erosion.

About one-third of the acreage of this soil is used for crops. The rest is used for pasture, woodland, or wildlife habitat. This soil is suited to most crops commonly grown in the county. It has severe limitations for many nonfarm uses. Capability unit IIw–4; woodland suitability group 2o2; wildlife group 6; recreation group 5.

Fallcreek Variant

The Fallcreek variant soils are moderately well drained and gently sloping and sloping. They are on glacial till plains. Native vegetation is hardwood forest consisting mainly of northern red oak, sugar maple, and basswood.

In a representative profile the surface layer is dark grayish brown loam about 8 inches thick. The subsoil

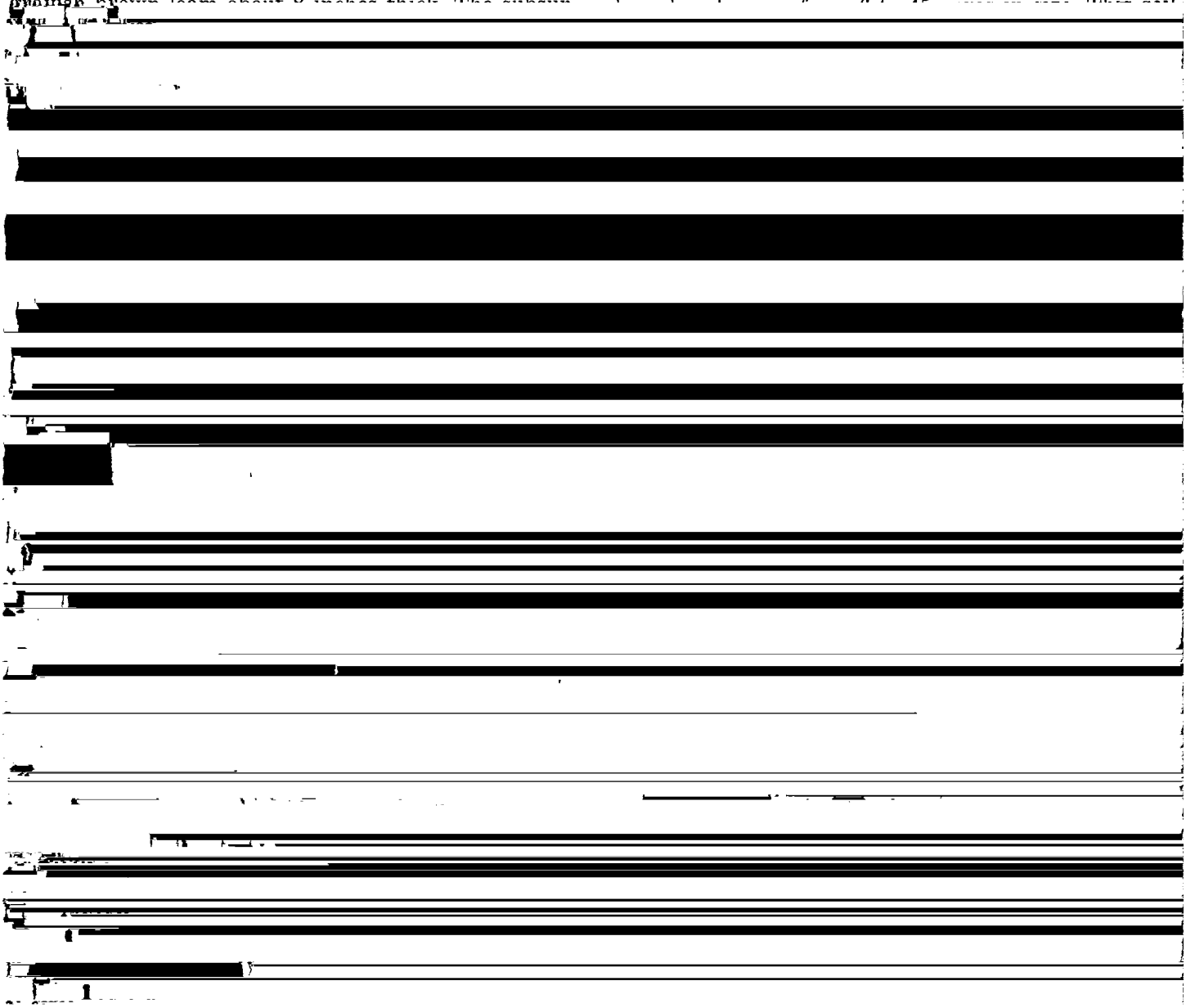
firm; thin discontinuous clay films on ped faces; medium acid; gradual smooth boundary.

C—48 to 60 inches; reddish brown (5YR 4/4) heavy loam; massive; firm; medium acid.

Thickness of the solum ranges from 30 to 50 inches. The Ap horizon is very dark grayish brown (10YR 3/2) or dark grayish brown (10YR 4/2). In uncultivated areas the A1 horizon is very dark gray (10YR 3/1) or black (10YR 2/1). The A2 horizon is grayish brown (10YR 5/2) or brown (10YR 5/3). The A&B and B&A horizons vary in thickness and have the same colors as the A2 and B2t horizons. The B2t, B3t, and C horizons are loam or clay loam and have few to many pebbles.

Fallcreek variant soils are near Fallcreek and Otterholt soils. The Fallcreek variants lack the mottling in the A2 and A&B horizons of the Fallcreek soils. Unlike Otterholt soils which formed in silt loam, the Fallcreek variants formed in loam.

FpB—Fallcreek loam, moderately well drained variant, 2 to 6 percent slopes. This gently sloping soil is on glacial till plains. Most areas are irregularly



dark grayish brown loamy sand about 9 inches thick. The subsoil is about 19 inches thick. It is dark brown loamy sand in the upper 9 inches; dark yellowish brown medium sand in the next 4 inches; and brown, mottled medium and fine sand in the lower 6 inches. The substratum to a depth of about 60 inches is yellowish brown, mottled medium and fine sand.

Available water capacity and natural fertility are low. Permeability is rapid. The root zone is deep. Surface runoff is slow. The seasonal high water table is at a depth of 1 to 3 feet.

Less than half of the acreage of this soil is used for crops. The rest is in grasses or hardwood trees. A few areas have been planted to pine trees. This soil is used for most crops commonly grown in the county. Deep-rooted crops, such as alfalfa, benefit from the seasonal high water table. This soil is suited to irrigation and additions of organic matter, conserve moisture, and control soil blowing.

Thickness of the solum ranges from 20 to 40 inches and [illegible] suited to cultivated crops, commercially grown in the

C—28 to 60 inches; light yellowish brown (10YR 6/4) fine

GsB—Gotham loamy sand, sandstone substratum, 2

dark brown silt loam, and the lower part is olive silty clay loam. The substratum to a depth of about 60 inches is mottled, light brownish gray and olive stratified sandstone residuum and silty clay.

Included with this soil in mapping are small areas of Gale and Northfield soils. Small areas of wet soils are indicated by wet spot symbols on the soil map.

Runoff is medium to rapid, and the hazard of ero-

Representative profile of Hixton loam, 6 to 12 percent slopes, eroded (in an area where this soil is uneroded), in a cultivated field, 150 feet south and 400 feet west of the northeast corner of the NW¼ sec. 6, T. 27 N., R. 8 W.:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) loam; moderate fine subangular blocky structure; friable; slightly acid; abrupt smooth boundary.

A2—8 to 11 inches; brown (10YR 5/3) light loam; weak medium platy structure; friable; slightly acid;

Most areas of this soil are used for crops. This soil is moderately well suited to all crops commonly grown in the county. It has moderate limitations for most nonfarm uses. Capability unit IIIe–2; woodland suitability group 2o1; wildlife group 1; recreation group 1.

HnD2—Hixton loam, 12 to 20 percent slopes, eroded. This moderately steep soil is on hills and ridges on sandstone uplands. Most areas are long and narrow and range from 5 to 40 acres in size. This soil

Oa4—36 to 42 inches; black (10YR 2/1 broken face), very dark grayish brown (10YR 3/2 rubbed) sapric material; about 35 percent fibers, less than 10 percent fibers rubbed; thick platy structure; slightly acid; clear smooth boundary.

Oa5—42 to 60 inches; very dark gray (10YR 3/1 broken face) very dark grayish brown (10YR 3/2 rubbed) sapric material; about 15 percent fibers, less than 5 percent fibers rubbed; thick platy structure; slightly acid.

This soil is more than 60 inches thick over mineral soil in most places. The surface layer is muck or peat, but in most places it is muck. The organic soil beneath the surface layer ranges in fiber content from 10 to 35 percent unrubbed. Small amounts of woody fragments are in some areas.

Houghton soils are near Adrian and Markey soils. Houghton soils are deeper to underlying mineral soil than those soils.

Ug—Houghton muck, (0 to 2 percent slopes). This

lower part. In places areas of these soils are saturated at a depth of 3 to 5 feet during wet periods.

Most areas of these soils are in woods. Some areas have been cleared and are used for crops or pasture. These soils are suited to farming if erosion is controlled. They are also suited to pasture, woodland, and wildlife habitat. Limitations for nonfarm uses range from slight to severe.

In this county Humbird soils are mapped only in association with Ludington soils.

Representative profile of Humbird sandy loam in an uncultivated area of Ludington and Humbird soils, 2 to 6 percent slopes, 600 feet south and 500 feet east of the northwest corner of the SW¼ sec. 15, T. 27 N., R. 6 W.:

A1—0 to 1 inch; black (10YR 2/1) sandy loam; moderate

[redacted]

(10YR 4/4) and brown (10YR 5/3) mottles; weak thin platy structure; friable; strongly acid; clear

part of the soil and moderately slow in the lower part

practices are needed to reduce runoff, control erosion, conserve moisture, and maintain organic matter con-

are suited to some kinds of wildlife habitat. Limitations for most nonfarm uses are severe.

MdB—Menahga sand, 1 to 6 percent slopes. This gently sloping soil is on stream benches and outwash plains. Most areas are irregularly shaped and range from 25 to 300 acres in size. This soil has the profile described as representative for the series.

Included with this soil in mapping are small areas of Friendship, Plainfield, and Vilas soils. Small areas of Menagha soils that have been severely eroded by soil blowing are indicated by blowout spot symbols on the soil map.

Runoff is slow, and the erosion hazard is slight. This soil is subject to soil blowing. Management practices are needed to maintain plant cover and prevent erosion and soil blowing.

Most areas of this soil remain in native stands of [redacted] practices are needed to maintain plant cover and prevent erosion and soil blowing.

Most areas of this soil remain in woods. Areas that previously were cleared have been replanted to pine trees. This soil is not suited to farming. It is better suited to vegetation that does not demand much water, such as red pine and jack pine. It has moderate or severe limitations for most nonfarm uses. Capability unit VIIs–9; woodland suitability group 3s1; wildlife group 3; recreation group 4.

Meridian Series

The Meridian series consists of well drained, nearly [redacted]

MeA—Meridian loam, 0 to 2 percent slopes. This nearly level soil is on stream terraces and outwash plains. Most areas are irregularly shaped and range from 20 to 100 acres in size. This soil has the profile described as representative for the series.

Included with this soil in mapping are small areas of Meridian soils that are moderately well drained and small areas of Tell soils.

Runoff is slow, and the erosion hazard is slight. for the series, but it has mottles in the lower part of the subsoil.

Included with this soil in mapping are small areas of moderately well drained Billet soils and areas of Meridian and Shiffer soils.

Runoff is slow, and the erosion hazard is slight. This soil has a seasonal fluctuating water table at a depth of 3 to 5 feet. At times, as the water table

A2—3 to 8 inches; grayish brown (10YR 5/2) light loamy sand; few medium distinct dark yellowish brown (10YR 4/4) mottles; weak thin platy structure; friable; very strongly acid; clear wavy boundary.

Bir—8 to 13 inches; dark brown (7.5YR 4/4) light sandy loam; common medium distinct grayish brown (10YR 5/2) mottles and common medium faint brown (10YR 5/3) mottles; weak medium subangular blocky structure; friable; strongly acid; clear wavy boundary.

A'2—13 to 18 inches; brown (10YR 5/3) loamy sand; common medium faint yellowish brown (10YR 5/4) mottles and common medium distinct brown

Available water capacity and natural fertility are low in these soils. Permeability is rapid. In undrained areas these soils are saturated at a depth of 1 to 3 feet during wet periods.

Some areas of these soils are used for crops, but large areas remain in woods. These soils are suited to farming if excess water is removed. They are also suited to wildlife habitat and woodland. Limitations for many nonfarm uses are severe.

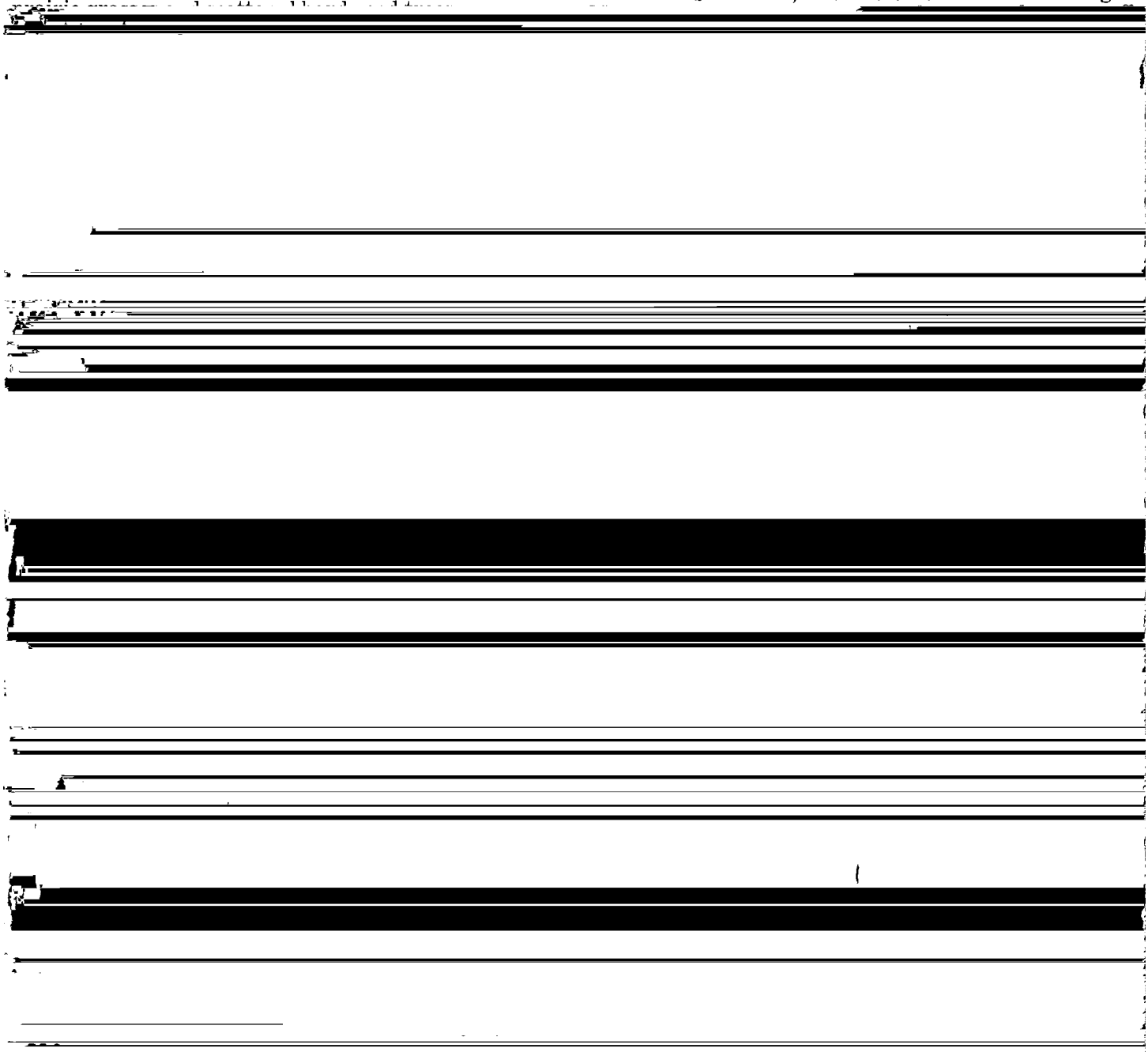
Representative profile of Morocco loamy sand that has 0 to 2 percent slopes, in a cultivated field, 400 feet

Mt. Carroll Series

The Mt. Carroll series consists of well drained, nearly level to sloping, silty soils on ridges, valley slopes, and stream terraces. These soils formed in thick silt loam deposits. Native vegetation is mixed

Included with this soil in mapping are small areas of Mt. Carroll soils that have a thinner and lighter colored surface layer. Also included are areas of this soil that are underlain by sand or sandstone at a depth of 40 to 60 inches.

Runoff is medium, and the erosion hazard is slight.



In a representative profile the surface layer is very dark brown silt loam about 9 inches thick. The subsurface layer is dark grayish brown silt loam about 4 inches thick. The subsoil is brown and dark brown silt loam about 31 inches thick. The substratum to a depth of about 60 inches is yellowish brown silt loam.

control erosion, maintain organic matter content, and improve tilth.

All but a few small areas of this soil are used for crops. This soil is well suited to all crops commonly grown in the county, and it is suited to such specialty crops as snap beans, peas, and sweet corn. This soil is

slight or moderate limitations for most nonfarm uses. Capability unit I–1; woodland suitability group 2o1; wildlife group 1; recreation group 1.

Newson Series

The Newson series consists of nearly level, poorly drained sandy soils in slight depressions on stream terraces. Native vegetation is grasses, shrubs, and

drainage. If tile drains are used, care must be taken to prevent loose sand from entering the tile line. If this soil is excessively drained, it becomes droughty. Crops grown on this soil are subject to frost damage. Management practices are needed to control drainage and supply regular additions of organic matter.

Some areas of this soil are used for crops, but most areas are in water-tolerant grasses, shrubs, or trees. This soil is not well suited to farming, and even if it

silt loam or loam. The A1 horizon, where present, is 2 to 4 inches thick and is black (10YR 2/1), very dark gray (10YR 3/1), or very dark grayish brown (10YR 3/2). The A2 horizon, where present, is brown (10YR 5/3). It ranges in thickness from 2 to 6 inches. The texture of the B3 horizon is very fine sandy loam or loam. The C horizon contains strata of strongly cemented sandstone.

Norden soils are near Gale, Seaton, and Urne soils. Norden soils are underlain by glauconitic sandstone, and Gale soils are underlain by sandstone that contains no glauconite. Norden soils formed in residuum from glauconitic sandstone, and Seaton soils formed in thick silty deposits. Norden soils are more silty and less sandy in the upper part of the solum than Urne soils.

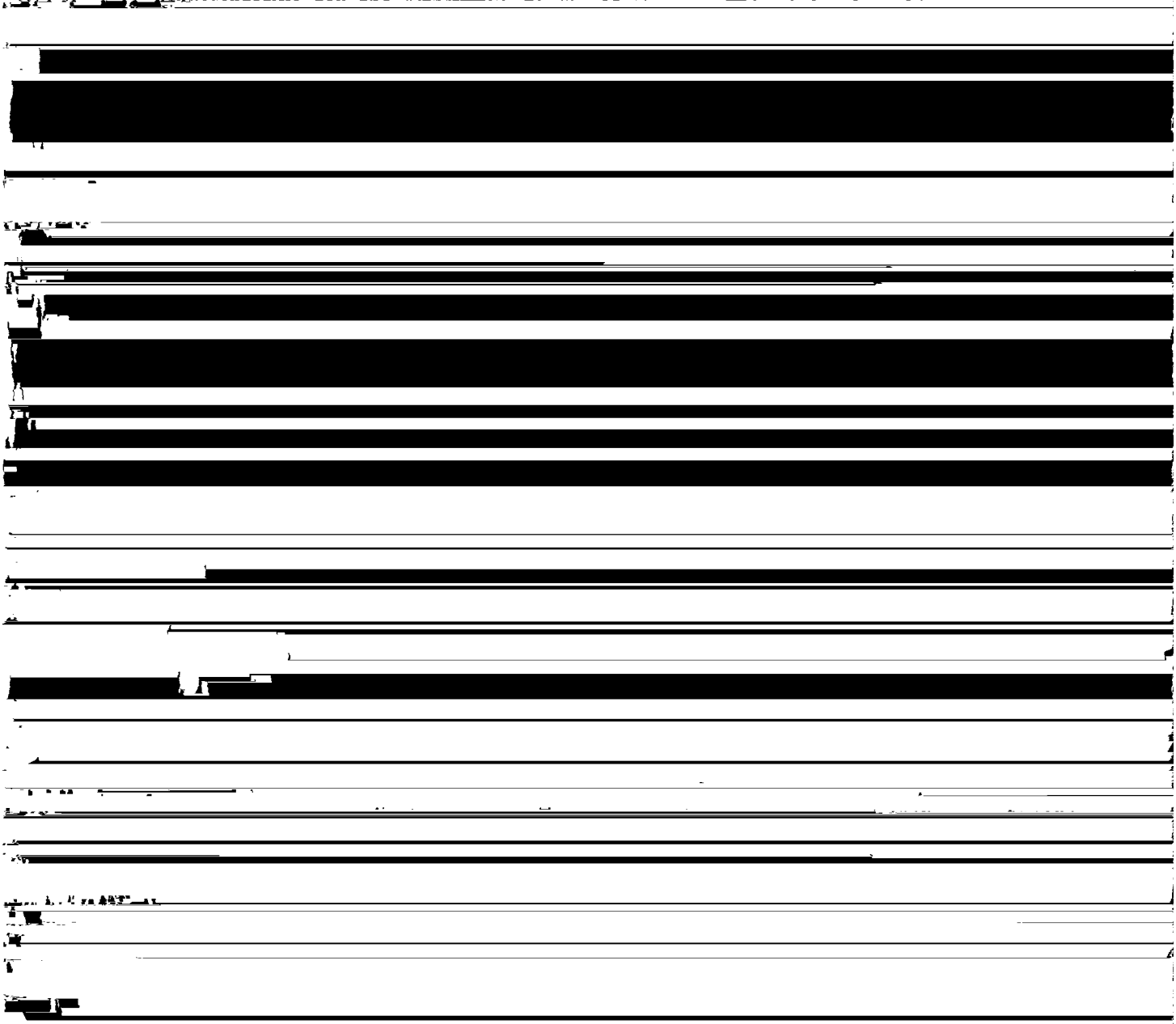
NrC2—Norden silt loam, 6 to 12 percent slopes, eroded. This sloping soil is on the crests and at breaks below the crests of moderately narrow ridgetops. Most areas are long and narrow and range from 10 to 40 acres in size. This soil has a profile similar to the one [illegible]

Runoff is very rapid, and the erosion hazard is very severe. Management practices are needed to maintain plant cover, control erosion, and reduce runoff.

Most areas of this soil are used for pasture, woodland, or wildlife habitat. This soil is generally unsuited to cultivated crops. It is suited to hay crops, pasture, woodland, or wildlife habitat. It has severe limitations for most nonfarm uses. Capability unit VIe–2; woodland suitability group 2r1; wildlife group 1; recreation group 1.

Northfield Series

The Northfield series consists of well drained, gently sloping to very steep, silty soils that are underlain by platy sandstone at a depth of less than 20 inches (fig. 7). These soils are on sandstone ridges.



in woods or are used for permanent pasture. Gently sloping and sloping soils range from moderately well suited to not well suited to farming. Steeper soils are better suited to woodland, permanent pasture, or wildlife habitat. Limitations for many nonfarm uses are severe.

Representative profile of Northfield silt loam, 2 to 6 percent slopes, in a cultivated field, 450 feet north and 100 feet west of the southeast corner of sec. 20, T. 27 N., R. 10 W.:

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) when dry; weak medium subangular blocky structure; friable; slightly acid; abrupt smooth boundary.

B1—7 to 10 inches; dark brown (10YR 4/3) silt loam; weak medium subangular blocky structure; friable; slightly acid; clear smooth boundary.

B2t—10 to 16 inches; dark yellowish brown (10YR 4/4) heavy silt loam; moderate medium subangular blocky structure; firm; thin patchy clay films; slightly acid; abrupt smooth boundary.

R—16 inches; yellow (10YR 7/6) and yellowish brown (10YR 5/6) hard platy sandstone.

Thickness of the solum and depth to sandstone range from 12 to 20 inches. The Ap horizon is very dark grayish brown (10YR 3/2) or dark grayish brown (10YR 4/2) in places. In uncultivated areas there is a thin black (10YR 2/1) A1 horizon and a brown (10YR 5/3) platy A2 horizon. In places a few sandstone fragments are on the surface and throughout the profile.

Northfield soils are near Elkmound, Gale, and Urne soils that have small sandstone fragments on the surface and throughout the profile.

Runoff is medium, and the erosion hazard is moderate. Low available water capacity limits crop yields during most seasons. Management practices are needed to control erosion, reduce runoff, conserve moisture, maintain organic matter content, and improve tilth.

About two-thirds of the acreage of this soil is used for crops. The rest is in grass and trees. This soil is not well suited to cultivated crops commonly grown in the county. It is suited to pasture, woodland, and wildlife habitat. It has severe limitations for many nonfarm uses. Capability unit IVe–3; woodland suitability group 3d1; wildlife group 4; recreation group 3.

NtD2—Northfield silt loam, 12 to 20 percent slopes, eroded. This moderately steep soil is on ridges and hillsides on sandstone uplands. Most areas are long and narrow and range from 8 to 50 acres in size. The profile of this soil is similar to the one described as representative for the series, but the surface layer is slightly lighter colored. Sandstone fragments are common on the surface of this soil and throughout the profile.

Included with this soil in mapping are areas of Elkmound soils. Also included are areas of severely eroded Northfield soils and areas where sandstone fragments are on the surface and throughout the

ing to weak very fine subangular blocky; friable; few thin dark grayish brown (10YR 4/2) strata of alluvium; slightly acid; abrupt smooth boundary.

A13—15 to 21 inches; black (10YR 2/1) silt loam; massive; friable; slightly acid; clear smooth boundary.

A14—21 to 28 inches; black (10YR 2/1) silt loam; common coarse prominent dark reddish brown (5YR 3/4) mottles; massive; friable; slightly acid; clear smooth boundary.

C1g—28 to 42 inches; gray (5Y 6/1) silt loam; many medium prominent strong brown (7.5YR 5/6 and 5/8) mottles; massive; friable; slightly acid; clear smooth boundary.

C2g—42 to 60 inches; olive gray (5Y 5/2) silt loam; many medium prominent strong brown (7.5YR 5/6 and 5/8) mottles; massive; friable; slightly acid.

Thickness of the A horizon ranges from 24 to 40 inches. The A horizon is black (10YR 2/1 or N 2/0), very dark gray (10YR 3/1), or very dark grayish brown (10YR 3/2).

Otter soils are near Ettrick and Orion soils. They lack the Bt horizon of Ettrick soils. Otter soils are poorly drained, and Orion soils are somewhat poorly drained.

Or—Otter silt loam, overwash (0 to 2 percent slopes). This nearly level soil is on flood plains. Most areas are long and narrow and range from 10 to 60 acres in size.

Included with this soil in mapping are small areas of Ettrick and Orion soils. Also included are areas of Otter soils that have a surface layer of muck and other areas that have thin strata of sandy loam in the surface layer.

Runoff is very slow, and the erosion hazard is slight. Management practices are needed to remove excess water and provide protection from flooding.

If protected from flooding and adequately drained, this soil is suited to cultivated crops. It has severe limitations for most nonfarm uses. Capability unit IIw-1; woodland suitability group 2w1; wildlife group 7; recreation group 7.

Figure 8.—**Profile of Otterholt silt loam.**

Otterholt Series

The Otterholt series consists of well drained, gently sloping and sloping soils on till plains (fig. 8). These soils formed in thick silt loam deposits over fine sandy loam glacial till. Native vegetation is hardwood trees, mainly northern red oak, sugar maple, and basswood.

In a representative profile the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsurface layer is dark grayish brown silt loam about 10 inches thick. The subsoil is dark yellowish brown silt loam about 26 inches thick. The substratum to a depth of about 60 inches is dark brown silt loam in the upper 12 inches and reddish brown fine sandy loam below.

Available water capacity is very high in these soils, and natural fertility is high. Permeability is moderate.

Most areas of these soils are used for crops. A few small areas are in pasture or trees. Otterholt soils are well suited or moderately well suited to farming if

vated field, 1,200 feet south and 50 feet east of the northwest corner of sec. 9, T. 27 N., R. 6 W.:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) when dry; weak fine subangular blocky structure; friable; neutral; clear abrupt boundary.

A2—8 to 12 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium platy structure; friable; slightly acid; clear irregular boundary.

A&B—12 to 18 inches; dark grayish brown (10YR 4/2) tongues of silt loam (A2) make up about 60 percent of the matrix; moderate medium platy structure; dark yellowish brown (10YR 4/4) silt loam (B2t); moderate fine subangular blocky structure; friable; thin bands of strong brown (7.5YR 5/6) border the tongues of A2 material; slightly acid; abrupt irregular boundary.

B&A—18 to 31 inches; dark yellowish brown (10YR 4/4) silt loam (B2t); weak coarse prismatic structure parting to moderate medium subangular blocky; friable; dark grayish brown (10YR 4/2) tongues of loam (A2) make up about 20 percent of the matrix; weak medium platy structure; friable; thin discontinuous clay films on ped faces with blocky structure; very strongly acid; clear smooth boundary.

B3t—38 to 44 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; few thin discontinuous clay films on ped faces; very strongly acid; clear smooth boundary.
C1—44 to 56 inches; dark brown (10YR 4/3) silt loam; massive; friable; strongly acid; clear smooth boundary.
IIC2—56 to 60 inches; reddish brown (5YR 4/4) fine sandy loam glacial till; massive; friable; few to many fine pebbles; medium acid.

Thickness of the solum ranges from 30 to 48 inches. Thickness of the silt loam deposit over glacial till ranges from 30 to 60 inches. The Ap horizon is very dark grayish brown (10YR 3/2) or dark grayish brown (10YR 4/2). The A2 horizon is dark grayish brown (10YR 4/2) or grayish brown (10YR 5/2). Texture of the IIC2 horizon is fine sandy loam or light loam.

Otterholt soils are near Fallcreek variant soils. They formed in material similar to that in which the Seaton soils formed. Otterholt soils have less sand throughout the A and B horizons than Fallcreek soils. Unlike the Seaton soils, Otterholt soils have extensions of the A2 horizon into the B horizon.

OsB—Otterholt silt loam, 2 to 6 percent slopes. This gently sloping soil is on broad ridges on glacial till crops. It is well suited to woodland. This soil has slight or moderate limitations for most nonfarm uses. Capability unit IIIe–1; woodland suitability group 1o1; wildlife group 1; recreation group 1.

Pillot Series

The Pillot series consists of well drained, gently sloping soils on outwash plains and stream terraces. Native vegetation is prairie grasses.

In a representative profile the surface layer is about 12 inches thick. It is very dark brown silt loam in the upper 9 inches and dark brown silt loam in the lower 3 inches. The subsoil is about 26 inches thick. It is dark yellowish brown silt loam in the upper part, dark yellowish brown heavy silt loam in the middle, and yellowish brown sandy loam in the lower part. The substratum to a depth of about 60 inches is very pale brown fine and medium sand.

Available water capacity is moderate in these soils, and natural fertility is medium. Permeability is mod-

from 20 to 160 acres in size. Included in mapping are small areas of Dakota and Tell soils.

Runoff is slow, and the erosion hazard is slight. Management practices are needed to reduce runoff, control erosion, and maintain organic matter content and good tilth.

Nearly all areas of this soil are used for crops. This soil is well suited to all crops commonly grown in the county, including specialty crops. If properly managed, it is highly productive. This soil is also suited to pasture and wildlife habitat. It has slight or moderate limitations for most nonfarm uses. Capability unit IIe–2; not placed in a woodland suitability group; wildlife group 5; recreation group 1.

Plainbo Series

The Plainbo series consists of excessively drained, gently sloping to very steep, sandy soils underlain by sandstone. Native vegetation is scrub oak and jack pine.

In a representative profile the surface layer is dark grayish brown loamy sand about 7 inches thick. The subsoil is about 14 inches thick. It is dark yellowish brown loamy sand in the upper part and dark yellowish brown sand in the lower part. The substratum to a depth of about 60 inches is yellowish brown sand in the upper 8 inches and light yellowish brown weakly cemented sandstone below.

brownish gray (10YR 6/2), or pale brown (10YR 6/3).

Plainbo soils are near Boone, Eleva, and Plainfield soils. Unlike Boone soils, Plainbo soils have a solum that is more than 5 percent weatherable minerals. Plainbo soils are coarser textured than Eleva soils, and they lack the horizon of clay accumulation of the Eleva soils. Plainbo soils formed partly or entirely in sandstone residuum, while Plainfield soils formed in deep sandy outwash.

PdB—Plainbo loamy sand, 2 to 6 percent slopes. This gently sloping soil is on ridgetops on sandstone uplands and on sandstone hills near sandy stream terraces and outwash plains. Most areas are irregularly shaped and range from 10 to 80 acres in size. The profile of this soil is similar to the one described as representative for the series, but the surface layer is slightly darker and thicker. Included in mapping are small areas of Plainfield soils.

Runoff is slow, and the erosion hazard is slight. This soil is subject to soil blowing. Low available water capacity limits crop yields during most seasons. It is better to plant early in spring before the soil has a chance to dry out than to plant later when the soil is drier. Management practices are needed to supply regular additions of organic matter, conserve moisture, reduce runoff, and control erosion and soil blowing.

About two-thirds of the acreage of this soil is used for crops. This soil is not well suited to most crops commonly grown in the county. Because of low available water capacity, deep rooted crops such as alfalfa-brome grass grow better than other crops. Supple-

In a representative profile the surface layer is dark grayish brown loamy sand about 6 inches thick. The subsoil is about 23 inches thick. It is dark brown light loamy sand in the upper part and dark yellowish brown sand in the lower part. Below this to a depth of about 60 inches is yellowish brown and light yellowish brown fine and medium sand.

Available water capacity and natural fertility are low in these soils. Permeability is rapid.

practices are needed to supply regular additions of organic matter, conserve moisture, reduce runoff, and control erosion and soil blowing.

About two-thirds of the acreage of this soil is used for crops. The rest is in native scrub oak or jack pine or has been planted to pine trees. This soil is not well suited to cultivated crops. It is suited to irrigation and can be intensively cropped if properly irrigated. This soil is well suited to pine trees. It has slight or moder-

layer, this soil has slightly higher available water capacity than the representative Plainfield soil. This results in slightly higher crop yields, especially in such deep rooted crops as alfalfa. This soil is suited to irrigation and can be intensively cropped if properly irrigated. This soil is also suited to pine trees. Some areas are used for homesites. In places the loamy layer in the substratum restricts movement of effluent from septic tank absorption fields. This soil has slight or moderate limitations for many nonfarm uses. Capability unit IVs–3; woodland suitability group 3o1; wildlife group 3; recreation group 4.

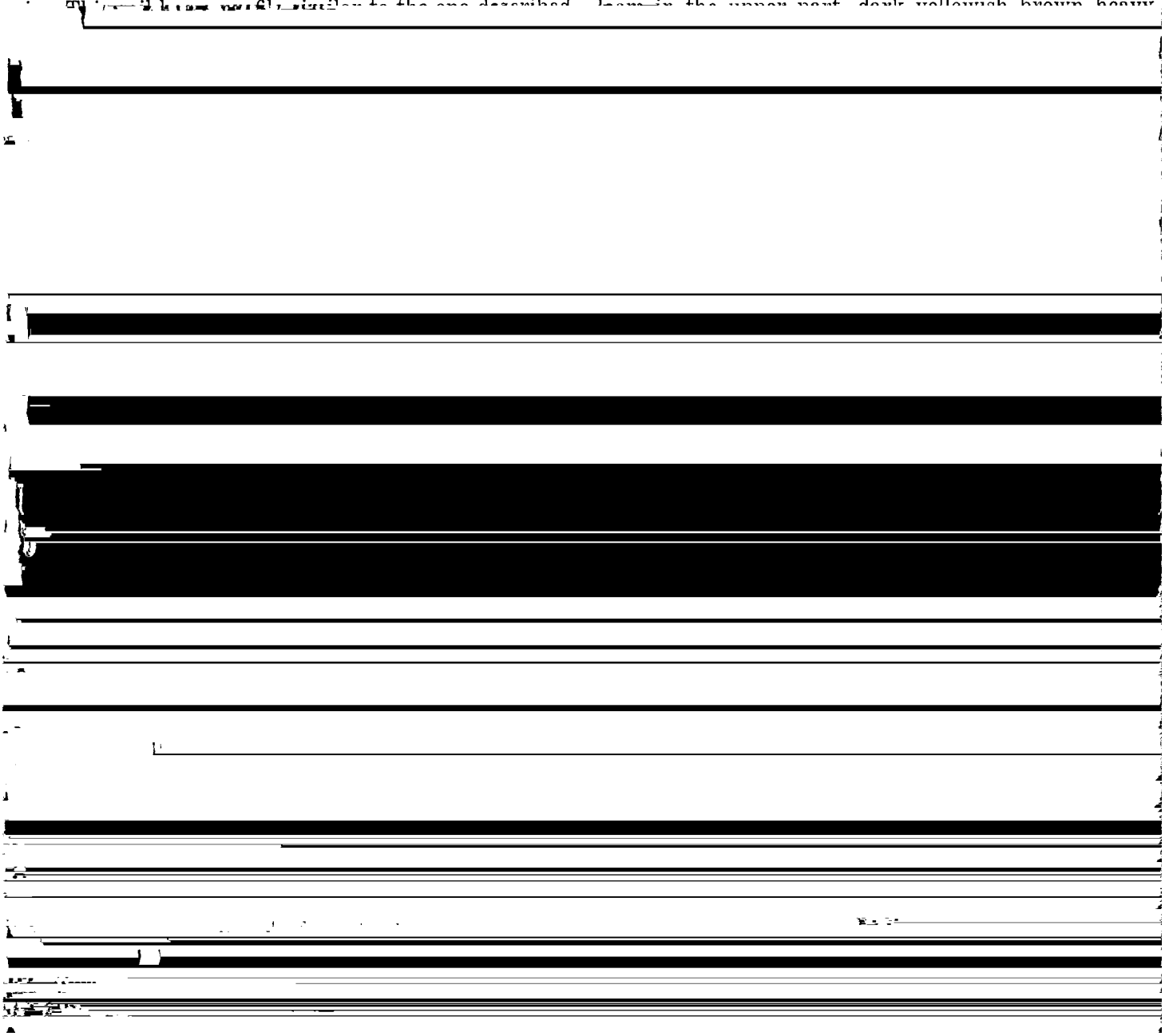
PlC2—Plainfield loamy sand, loamy substratum, 6 to 12 percent slopes, eroded. This sloping soil is on stream terraces and outwash plains. Most areas are irregularly shaped and range from 8 to 45 acres in [illegible] similar to the one described

better suited to selected recreational uses than to other types of uses. In places it is a source of sand and gravel for commercial uses. It has severe limitations for most nonfarm uses. Capability unit VIIIs–10; woodland suitability group 6s1; wildlife group 10; recreation group 7.

Seaton Series

The Seaton series consists of well drained, nearly level to steep silty soils on ridges, in valleys, and on stream terraces. These soils formed in thick silt loam deposits. Native vegetation is hardwood trees.

In a representative profile the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is about 32 inches thick. It is yellowish brown silt loam in the upper part, dark yellowish brown heavy



SeB—Seaton silt loam, 2 to 6 percent slopes. This gently sloping soil is on moderately broad ridgetops. Most areas are irregularly shaped and range from 20 to 100 acres in size.

Included with this soil in mapping are small

sequence. This soil is suited to pasture, woodland, and wildlife habitat. It has moderate or severe limitations for most nonfarm uses. Capability unit IVe–1; woodland suitability group 1r1; wildlife group 1; recreation

Runoff is slow, and the erosion hazard is slight. Some areas of this soil dry out slowly in spring, and

Most areas of these soils are farmed. A few areas are in woods or pasture or are used for wildlife habi-

ture, woodland, and wildlife habitat. It has moderate or severe limitations for most nonfarm uses. Capabil-

representative for the series. Also included are areas of Sparta soils that have slopes of as much as 10 per-

Thickness of the solum ranges from 20 to 40 inches, nearly the same as the thickness of the silty and loamy material over sand. The Ap horizon is dark grayish brown (10YR 4/2) or very dark grayish brown (10YR 3/2). In places the A2 horizon is lacking because of plow mixing, and in places the IIB3t horizon is sandy loam.

Tell soils are near Meridian, Pillot, and Seaton, benches, soils. Tell soils are finer textured than Meridian soils. They lack the thick, dark colored A horizon of Pillot soils. Tell soils are shallower to sand than Seaton, benches, soil.

TeA—Tell silt loam, 0 to 2 percent slopes. This nearly level soil is on stream terraces and outwash plains. Most areas are irregularly shaped and range from 8 to 50 acres in size. This soil has a profile simi-

to maintain plant cover, conserve moisture, and control erosion and soil blowing.

This land type is unsuited to farming. It needs a cover of permanent vegetation to prevent erosion. Trees that require little water, such as red pine, grow in areas of this land type, but they are difficult to manage because of the steep slopes. This land type is suited to some types of upland wildlife habitat. It has severe limitations for nonfarm uses. Capability unit VIIs–9; woodland suitability group 4s2; wildlife group 3; recreation group 4.

water capacity limits crop yields during most seasons. It is better to plant early in spring before the soil has a chance to dry out than to plant later. Management practices are needed to supply regular additions of organic matter, conserve moisture, reduce runoff, and control erosion and soil blowing.

Most areas of this soil are used for crops. A few areas have been planted to pine trees. This soil is not well suited to most crops commonly grown in the county. It is suited to irrigation and can be more intensively cropped if properly irrigated and managed. This soil is suited to pasture, pine trees, and some kinds of wildlife habitat. It has slight or moderate [redacted]

sides of ridges. Most areas are long and narrow and range from 10 to 50 acres in size. This soil has a profile similar to the one described as representative for the series, but it is slightly deeper to sandstone.

Included with this soil in mapping are small areas of Elkmound soils. Also included are areas of severely eroded Urne soils.

Runoff is rapid, and the erosion hazard is severe. Management practices are needed to maintain organic matter content, conserve moisture, reduce runoff, and control erosion.

Less than half of the acreage of this soil is used for [redacted] The rest is in pasture, woodland, or wildlife

Representative profile of Veedum silt loam that has 0 to 2 percent slopes, in an uncultivated field, 950 feet north and 400 feet east of the southwest corner of the NW¼ sec. 36 T. 25 N., R. 5 W.:

A1—0 to 12 inches; black (10YR 2/1) silt loam; weak medium granular structure; friable; strongly acid; clear smooth boundary.

A2g—12 to 17 inches; gray (10YR 5/1) sandy loam; many coarse prominent dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6 and 5/8) mottles; weak medium subangular blocky structure; friable; very strongly acid; clear smooth bound-

interbedded sandstone and shale. Native vegetation is mainly elm, soft maple, aspen, and ash.

In a representative profile the surface layer is very dark gray loam about 8 inches thick. The subsurface layer is grayish brown, mottled loam about 9 inches thick. The subsoil is gray, mottled loam about 16 inches thick. The substratum is gray sand in the upper 6 inches and gray weathered sandstone that contains thin grayish green silty clay layers between depths of 6 and 60 inches.

Available water capacity is moderate in these soils

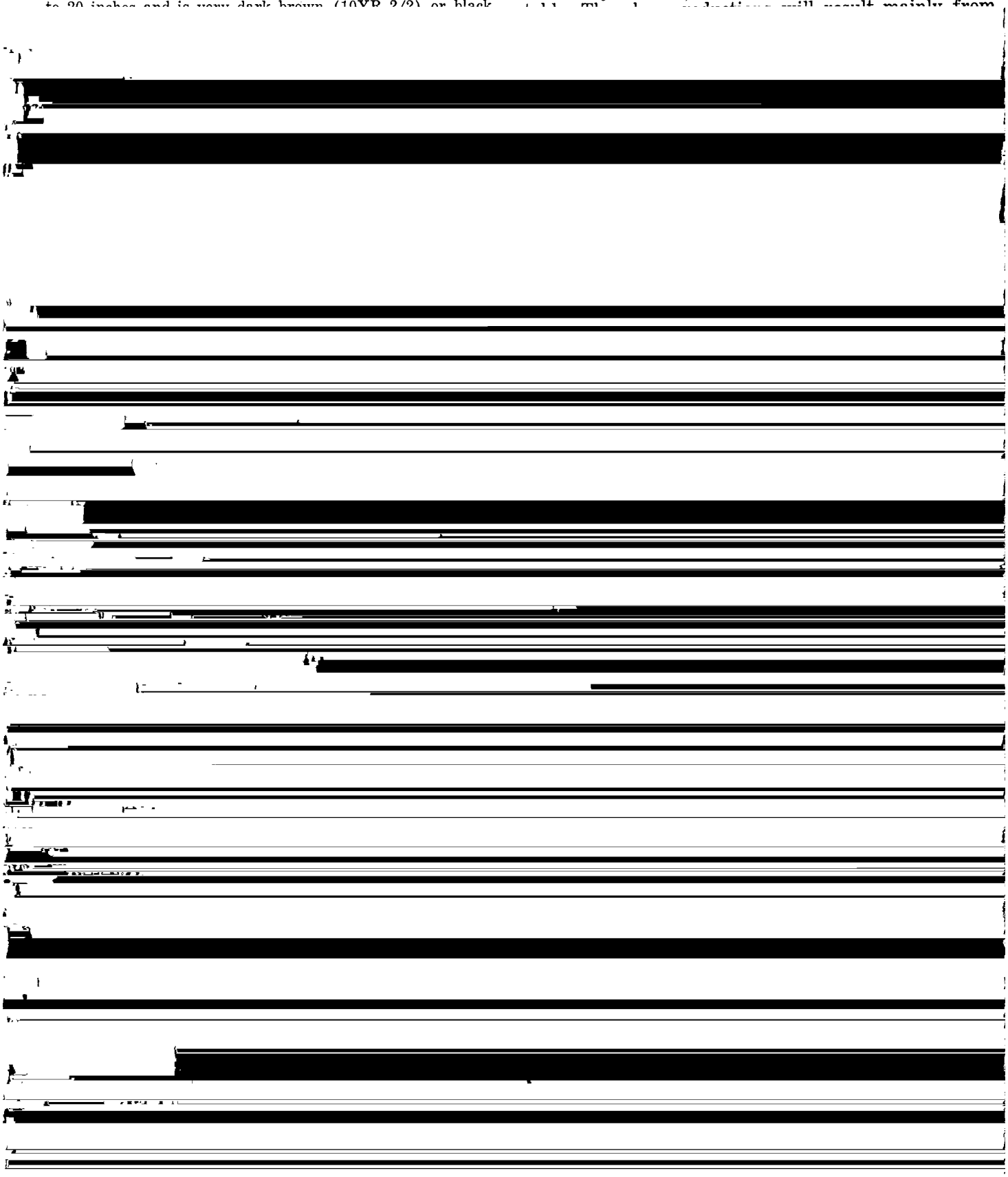
and is commonly ponded during wet seasons and after heavy rains. Surface drainage removes excess water rapidly. Deep ditches or tile drains are used for internal drainage. Crops grown on this soil are subject to frost damage. Management practices are needed to remove excess water and maintain good tilth.

Most areas of this soil are in woods. Some areas are

VlB—Vilas sand, 1 to 6 percent slopes. This nearly level and gently sloping soil is on stream terraces and outwash plains. Most areas are irregularly shaped and range from 25 to 200 acres in size. The smaller areas are mainly elongated tracts parallel to streams in narrow valleys. Included in mapping are areas of moderately well drained Vilas soils.

to 60 inches. The A1 horizon ranges in thickness from 10 to 20 inches and is very dark brown (10YR 2/2) or black

moderately reduced, and woodland acreage will remain



Wet soils, such as those of the Curran, Ettrick, and Houghton series, make up about 102,000 acres of Eau Claire County. These wet soils receive runoff from adjacent areas and are saturated at a depth of less than 3 feet for significant periods. In some areas they have moderately rapid, moderate, or moderately slow permeability in the subsoil; and in other areas they have a fluctuating high water table or are periodically flooded by stream overflow. Many of these soils can be

peas for canning, dried beans, snap beans, and horseradish are the main specialty crops. Some strawberries, cabbage, carrots, tomatoes, cucumbers, and melons are also grown.

The soils of Eau Claire County range widely in their suitability for these crops, and in many cases special management is needed to assure good growth. Fertile soils that have high available water capacity, such as those in the Mt. Carroll and Seaton series, are

a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close growing plant cover is maintained; *w* means that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in some parts of the United States but not in this county, indicates that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few or no limitations. Class V can contain, at the most, only subclasses w, s, and c, because the soils are subject to little or no erosion but have other limitations that confine their use largely to

tively, because not all of the units used in Wisconsin are in this county. To find the names of all the soils in any given capability unit, refer to the "Guide to Mapping Units" at the back of this survey.

CAPABILITY UNIT I–1

This unit consists of nearly level, well drained and moderately well drained soils that are silt loam throughout. These soils formed in thick silty deposits.

Permeability is moderate. Available water capacity is high and very high, and natural fertility is high. Runoff is slow. The hazard of erosion is slight.

The soils in this unit are easy to manage and can be cropped intensively if good tilth is maintained. Minimum tillage, good residue management, cropping sequences, and use of green manure crops help to

erosion and maintain available water capacity and good tilth.

If properly managed, these soils are well suited to

If adequately drained and protected from overflow, these soils are suited to corn, soybeans, small grain, grasses, and legumes. Because of wetness, legumes are

CAPABILITY UNIT IIw–4

This unit consists of nearly level and gently sloping

If adequately drained, these soils are suited to corn, soybeans, small grain, certain vegetable crops, grasses

loam or silt loam. They are underlain by silt loam or loamy glacial till.

Permeability is moderate or moderately slow. Available water capacity is high or very high, and natural fertility is high or medium. Runoff is medium to

Controlling erosion and maintaining available water capacity are the main concerns of management. Maintaining good tilth is also a concern. Such conservation practices as a cropping system that includes a cropping sequence, contour farming, contour stripcrop-

contour stripcropping, diversions, grassed waterways, minimum tillage, cover crops, a cropping sequence, and good residue management help to control erosion and maintain available water capacity.

If properly managed, these soils are moderately well

Removing excess water, controlling erosion on gently sloping soils, and providing plant nutrients are the main concerns of management. Surface drainage, terraces, diversions, and grassed waterways help to remove excess water and control erosion. Minimum til-

conservation practices as a cropping system that includes contour farming, a cropping sequence, stripcropping (fig. 9), field windbreaks, minimum tillage, good residue management, and use of cover crops help to control erosion and soil blowing and maintain available water capacity and organic matter content.

If properly managed, these soils are moderately well suited to corn, soybeans, small grain, grasses, and legumes. It is better to plant early in spring before the soil has a chance to dry than to plant later in spring. Later plantings, especially of small seeded crops, are likely to have a poor survival rate. Some soils in this unit are suited to irrigation. If irrigated, they are suited to more intensive cropping. These soils are also suited to pasture. Some areas are used for woodland or wildlife habitat.

CAPABILITY UNIT IVe–1

Seaton silt loam, 12 to 20 percent slopes, eroded, is the only soil in this unit. This well drained, moder-

ture. Some areas are used for woodland or wildlife habitat.

CAPABILITY UNIT IVe–2

This unit consists of moderately steep, well drained or somewhat excessively drained soils that have a surface layer of very fine sandy loam, loam, or silt loam. They are underlain by sandstone bedrock at a depth of 20 to 40 inches.

Permeability is moderate. Available water capacity is moderate, and natural fertility is medium. Runoff is rapid. The hazard of erosion is severe. In most areas that have been cultivated, the soil has lost as much as 6 inches of the original surface layer by erosion.

Controlling erosion and maintaining available water capacity and good tilth are the main concerns of management. Such conservation practices as a cropping system that includes contour farming, contour stripcropping, diversions, grassed waterways, minimum tillage, a cropping sequence, and good residue manage-

[redacted]

liner and can support a large population of plants. If contour stripcropping help to control erosion on slop-

inches of the original surface layer by erosion. In most of these areas the subsoil is exposed.

Controlling erosion, preventing soil deterioration, and maintaining available water capacity are the main concerns of management. Controlled grazing, renovation, and fertilization help to maintain adequate plant cover and available water capacity and control erosion.

Because of the very severe erosion hazard and steep slopes, these soils are generally unsuited to cultivated crops. If properly managed, they are suited to pasture and hay. Growth of hay and pasture crops is inhibited slightly because these soils are droughty, particularly during seasons of little or poorly distributed rainfall. Many areas of these soils are in permanent pasture or woods. These soils are also used for wildlife habitat.

CAPABILITY UNIT VIe–3

This unit consists of moderately steep, somewhat excessively drained and well drained soils that have a surface layer of sandy loam, loam, and silt loam. These soils have a subsoil that is gravelly loamy sand, sandy loam, loam, and silt loam. They are underlain by sand and gravel or sandstone bedrock at a depth of 10 to 20 inches.

Permeability is moderate or moderately rapid. Available water capacity is low, and natural fertility is low or medium. Runoff is rapid. The hazard of erosion is severe. The root zone is restricted by the underlying sand and gravel or sandstone bedrock.

Controlling soil loss by erosion, preventing soil deterioration, and maintaining available water capacity are the main concerns of management. Controlled grazing, pasture renovation, and fertilization help to control erosion and maintain adequate plant cover and available water capacity.

Because of the severe erosion hazard, shallow root zone, and low available water capacity, these soils are generally unsuited to cultivated crops. If properly managed, they are suited to hay and pasture. Growth is generally poor, however, especially during dry seasons or seasons of poorly distributed rainfall. Many areas of these soils are used for woodland and wildlife habitat.

CAPABILITY UNIT VIs–3

This unit consists of sloping, excessively drained soils that have a surface layer of loamy sand. These soils have a subsoil that is loamy sand or sand. They are underlain by sand or sandstone bedrock.

Permeability is rapid. Available water capacity is very low, and natural fertility is low. Runoff is medium. The hazard of water erosion is moderate. These soils are susceptible to soil blowing.

Controlling water erosion and soil blowing and maintaining organic matter content and available water capacity are the main concerns of management Controlled grazing, pasture renovation, and fertilization help to maintain plant cover and available water

unsuited to cultivated crops. If properly managed, these soils are suited to pasture or hay, but production is low. It is better to plant pasture and hay early in spring before the soil has a chance to dry than to plant later. (Later plantings are likely to have a poor survival rate.) Many areas of these soils are in woodlots or are established in pine plantations. Some areas are used for wildlife habitat.

CAPABILITY UNIT VIIe–2

Urne very fine sandy loam, 20 to 45 percent slopes, is the only soil in this unit. The subsoil is very fine sandy loam underlain by sandstone bedrock at a depth of 20 to 40 inches.

Permeability is moderate. Available water capacity is moderate, and natural fertility is medium. Runoff is very rapid. The hazard of erosion is very severe.

Controlling soil loss by erosion and preventing soil deterioration are the main concerns of management.

Because of steep slopes and the very severe erosion hazard, this soil is unsuited to cultivated crops. Areas of less steep soil can be renovated and maintained in pasture if grazing is carefully controlled. Most areas of this soil are used for woodland or wildlife habitat.

CAPABILITY UNIT VIIe–3

This unit consists of steep and very steep, well drained soils that have a surface layer of loam or silt loam and a subsoil of loam or silt loam. They are underlain by sandstone bedrock at a depth of less than 20 inches.

Permeability is moderate. Available water capacity is low, and natural fertility is low or medium. Runoff is very rapid. The hazard of erosion is very severe. The root zone is restricted by the underlying sandstone bedrock. In places bedrock outcrops are at the surface.

Controlling soil loss by erosion and preventing soil deterioration are the main concerns of management. Maintaining some kind of permanent plant cover helps to control erosion and soil damage.

Because these soils are steep and very steep and are erodible, they are unsuited to cultivation. Some areas are used for pasture, but they require very careful management to control erosion and soil damage. Most areas are used for woodland or wildlife habitat.

CAPABILITY UNIT VIIs–9

This unit consists of nearly level to very steep, excessively drained sandy soils and land types. The subsoil is sand or loamy sand underlain by sand or sandstone bedrock.

Permeability is rapid or very rapid. Available water capacity is low or very low, and natural fertility is low. Runoff is mostly slow or medium, but it is rapid on the moderately steep to very steep soils. The hazard of water erosion is slight on nearly level and gently sloping soils, moderate on sloping soils, and severe on moderately steep to very steep soils. These soils have a severe limitation because of droughtiness and they are

concerns of management. Maintaining a permanent tions, and on observations by soil scientists and other

TABLE 2.—*Predicted average yields per acre of principal crops under an improved, or high, level of management*

[Absence of a yield figure indicates that the soil is not suited to the crop, or that the crop is not ordinarily grown in the soil]

Map symbol	Soil name	Corn		Oats [1]	Alfalfa-brome hay [2] (dry weight)
		Grain	Silage		
		Bu	*Tons*	*Bu*	*Tons*
Ad	Adrian muck	90	17.0	50	
Ae	Alluvial land, sandy [3]				
Af	Alluvial land, wet [3]				
ArA	Arenzville silt loam, 0 to 3 percent slopes [4]	120	19.0	70	4.0
AtB	Arland sandy loam, 2 to 6 percent slopes	75	13.0	65	3.5
AtC2	Arland sandy loam, 6 to 12 percent slopes, eroded	70	12.0	60	3.0
AtD2	Arland sandy loam, 12 to 20 percent slopes, eroded	65	11.0	50	2.5
Au	Au Gres loamy sand	50	8.0	55	2.5
BlB	Billett sandy loam, 1 to 6 percent slopes	70	13.0	60	2.8
BlC2	Billett sandy loam, 6 to 12 percent slopes, eroded	60	9.0	50	2.2
BlD2	Billett sandy loam, 12 to 20 percent slopes, eroded	55	9.0	45	2.0
BmA	Billett sandy loam, moderately well drained, 0 to 3 percent slopes	85	14.0	65	3.0
BoB	Boone-Plainbo complex, 2 to 6 percent slopes				
BoC	Boone-Plainbo complex, 6 to 12 percent slopes				
BoE	Boone-Plainbo complex, 12 to 45 percent slopes				
BuA	Burkhardt sandy loam, 0 to 3 percent slopes	65	11.5	50	2.5
Cb	Cable loam		12.0	55	
CeA	Caryville loam, 0 to 3 percent slopes [4]	75	12.5	60	3.0
ClA2	Chetek sandy loam, 1 to 6 percent slopes	60	11.0	50	2.5

TABLE 2.—*Predicted average yields per acre of principal crops under an improved, or high, level of management*—Continued

Map symbol	Soil name	Corn		Oats [1]	Alfalfa-brome hay [2] (dry weight)
		Grain	Silage		
		Bu	*Tons*	*Bu*	*Tons*
MmA	Meridian loam, moderately well drained, 0 to 3 percent slopes	80	13.0	55	3.5
Mo	Morocco loamy sand	60	10.0	50	2.5
MrB	Mt. Carroll silt loam, 2 to 6 percent slopes	115	19.0	80	5.0
MrC2	Mt. Carroll silt loam, 6 to 12 percent slopes, eroded	110	18.0	75	4.5
Ms	Mt. Carroll silt loam, benches	120	20.0	80	5.0
Na	Newson loamy sand		10.0	45	2.0
NrC2	Norden silt loam, 6 to 12 percent slopes, eroded	90	15.0	65	4.0
NrD2	Norden silt loam, 12 to 20 percent slopes, eroded	80	14.0	60	3.5
NrE2	Norden silt loam, 20 to 30 percent slopes, eroded				3.0
NtB	Northfield silt loam, 2 to 6 percent slopes	75	8.0	60	3.0
NtC2	Northfield silt loam, 6 to 12 percent slopes, eroded	70	7.0	55	2.5

TABLE 3.—*Productivity and soil related limitations by woodland suitability groups*

[Dakota, Pillot, and Whitehall soils (DaA, PcB, and Wh) are not naturally wooded and therefore are not included in this table [1]]

Woodland suitability groups and map symbols	Potential productivity				Species to use for reforestation	Limitations because of—		
	Tree species	Average site index	Number of plots	Yearly growth per acre		Equipment	Erosion	Seedling mortality
				Fbm				
Group 1o1: OsB, OsC2, SeB, SeC2, SfB, SmA, SmB.	Northern red oak.	73	3	270	Red pine, white pine, eastern white pine, white spruce.	Slight	Slight	Slight.
	Sugar maple	66	1	110				
Group 1r1: SeD2, SeE2.	Northern red oak.	71	2	260	Red pine, eastern white pine, white spruce.	Moderate	Moderate	Slight on north and east facing slopes; moderate on south and west facing slopes.
	Sugar maple	66	(2)	110				
Group 2w1: Or	Silver maple	94	1	180	Silver maple, red maple, white ash, green ash.	Severe	Slight	Moderate.
	American elm	---	---	---				
	White ash	---	---	---				

TABLE 3.—*Productivity and soil related limitations by woodland suitability groups*—Continued

Woodland suitability groups and map symbols	Potential productivity				Species to use for reforestation	Limitations because of—		
	Tree species	Average site index	Number of plots	Yearly growth per acre		Equipment	Erosion	Seedling mortality
Cmoin 2cl— Ao. RoR	Jack pine	60	9	*Fbm* 95	Red pine, scot	Slight	Slight	Slight

indicates high productivity; 2, moderately high; 3, moderate; 4, moderately low; 5, low; and 6, unproductive.

The woodland suitability classes are based on growth potential (fig. 11) expressed as site index. Site index is defined as the average height of dominant and codominant trees of a given species at 50 years of age. The site indices for some of the more important species and soils have been measured; others are estimated from measurements made on trees of similar species in similar soils.

plots have been measured to justify calculation of the standard deviation, generally more than four plots.

Yields for other species were estimated from one of the preceding references for a similar species.

The second part of the symbol identifying a woodland suitability group is a small letter. This letter indicates the subclass and an important soil property that imposes a slight to severe limitation in managing the soils of the group for wood crops. The following are definitions of the subclasses:

Subclass w (excessive wetness).—Soils that have

means there is no restriction in the kind of equipment or in the time of year it is used; *moderate* means that

Presented in table 4 are trees suitable for specified uses and information on growth form and height at

use of equipment is restricted for less than 3 months of the year; and *severe* means that special equipment is needed and its use is restricted for more than 3 months of the year.

The erosion hazard refers to the potential hazard of soil losses in woodland. The hazard is *slight* if expected soil losses are small; *moderate* if some soil losses are expected and care is needed during logging and construction to reduce soil losses; *severe* if special methods of operation are necessary for preventing excessive soil losses,

Seedling mortality refers to the expected degree of mortality of planted seedlings as influenced by kinds of soil. Considered in the ratings are excessive soil wetness, hazard of flooding, slope and aspect, texture, structure, and plant competition. Normal rainfall, good planting stock, and proper planting are assumed. A rating of *slight* indicates an expected loss of less than 25 percent of the planted seedlings; *moderate,* a loss of 25 to 50 percent of the seedlings; and *severe,* a loss of more than 50 percent of the seedlings.

Landscaping and windbreak planting selection guide

This section provides information on trees, shrubs, and vines used in landscaping sites for homes, schools, industry, and recreation. It also provides information on species that are suitable for use as windbreaks around farmsteads or open fields.

A significant acreage in Eau Claire County is subject to soil blowing. Sandy and loamy soils of the

maturity. In table 5 shrubs and vines suitable for specific uses are listed and information on uses, growth form, and asthetic value are presented. The list of plants in these tables is a partial one designed to indicate certain plants suited to soils in the county. Many of the plants are suitable for both landscaping and food and cover for wildlife.

Use of the Soils for Wildlife Habitat[4]

The soils of Eau Claire County have a wide range in physical and chemical characteristics affecting the kind and amount of vegetation and wildlife they will support. Research has shown a direct relationship between soil fertility and the quantity and health of the wildlife.

Food and cover planting on lands used primarily or secondarily for wildlife production encourage wildlife. Wildlife benefit from such soil and water conservation practices as stripcropping, fertilization, and tree planting in areas used for pasture, woodland, and other purposes.

Most of the major soils are suitable for intensive farming and have a high potential for wildlife, but because of other uses, there is little wildlife habitat.

For wildlife interpretive purposes, the soils in Eau Claire County have been placed in 9 of the 10 groups of a statewide system of grouping and identification. Soils in group 2 are not in this county. The soils in each group are briefly described in table 6.

[redacted]

[The letters in parentheses following each species name have special significance: the first letter gives the general height of the tree, with "L" for columnar, "O" for oval, "P" for pyramidal,

Tree and shrub group and map symbol	Trees or shrubs suitable for—	
	Shade	Streets
SUNNY SITES		
Group 1: [redacted]	American beech (LO), sugar maple (LO), red maple (MO), red oak	Norway maple (MR), southern pin oak (MP), thornless honeylocust

[redacted]

and selection guide by tree and shrub group

indicating higher than 60 feet, "M" indicating 30 to 60 feet, and "S" less than 30 feet; the second letter gives the shape, with "C" standing "Q" for pendulous, and "R" for round]

Trees or shrubs suitable for—Continued		
Lawns	Hedges and screens	Windbreaks
SUNNY SITES—Continued		
Flowering crabapple (SR), mountainash (SO), blue beech (SR), paper birch (MO), river birch (MO), Russian-olive (SR), southern pin oak (MP), serviceberry (SR), horse chestnut (LR), Norway spruce (LP), red pine (LP), white pine (LP), white spruce (MP), black cherry (LO), blue spruce (LP), hawthorn (SR).	Redcedar (SP), white-cedar (MC, P), white pine (LP), white spruce (MP), Lombardy poplar (LC), Russian-olive (SR), upright yew (SP).	White spruce (MP), white-cedar (MC, P), white pine (LP), red pine (LP), Norway spruce (LP).
Flowering crabapple (SR), paper birch (MO), redcedar (SP), white pine (LP), white spruce (MP), red pine (LP), Russian-olive (SR).	Redcedar (SP), Russian-olive (SR), red pine (LP), white pine (LP), upright yew (SP), white spruce (MP).	Red pine (LP), white pine (LP), redcedar (SP).
White spruce (MP), paper birch (MO), mountainash (SO), weeping willow (MQ), white-cedar (MP), river birch (MO).	White-cedar (MC), white spruce (MP), lombardy poplar (LC), laurel willow (MO).	White-cedar (MC), white spruce (MP), white pine (LP).
White-cedar (MC), white spruce (MP), weeping willow (MQ).	White-cedar (MC), laurel willow (MO)------	Laurel willow (MO), poplar selections (LP), tree lilac (SO), white-cedar (MC).
PARTLY SHADED SITES—Continued		
Blue beech (SP), serviceberry (SR), white pine (LP), white spruce (MP), blue spruce (LP), Norway spruce (LP).	White-cedar (MC), white pine (LP), white spruce (MP), upright yew (SP).	White-cedar (MC, P), white pine (LP), white spruce (MP).
White pine (LP), white spruce (MP)-------	Upright yew (SP), white pine (LP), white spruce (MP).	White pine (LP).
White spruce (MP), mountainash (SO)------	White-cedar (MC), white spruce (MP)------	White-cedar (MC), white spruce (MP).
White-cedar (MC), white spruce (MP)------	White-cedar (MC)----------	White-cedar (MC).

TABLE 5.—*Shrubs and vines suited to the soils*

[The letter "X" indicates that the plant is suited to the use shown in the column heading]

Tree and shrub group and map symbols	Common name	Type of plant	Potential height	Suitable for—				
				Landscaping	Hedge, screen, and windbreak	Wildlife food and cover	Roadside planting	Ground cover
			Feet					
Group 1: Moderately deep and deep, moderately well drained to somewhat excessively drained, medium textured soils that have moderate to high available water capacity: ArA, DaA, FpB, FpC, GaB, GaC2, GaD2, GaE, HeC2, HkB (Hiles part only), HnB, HnC2, HnD2, MeA, MeB, MeC2, MmA, MrB, MrC2, Ms, NrC2, NrD2, NrE2, OsB, OsC2, PcB, SeB, SeC2, SeD2, SeE2, SfB, SmA, SmB, TeA, TeB, UnD2, UnE, Wh.	Arborvitae (shrub type)	Shrub	3–7	X	X	X		
	Autumn-olive	Shrub	10–15	X	X	X		
	Barberry, Japanese	Shrub	6	X	X	X		
	Bittersweet	Vine		X		X	X	X
	Blackberry, dewberry, blackcap raspberry.	Bramble	1–5			X	X	X
	Chokeberry, black	Shrub	1–3	X		X	X	X
	Cotoneaster	Shrub	4–8	X	X	X		
	Crabapple	Shrub	10–25	X	X	X	X	
	Currant, alpine	Shrub	6–7	X	X			
	Dogwood, gray	Shrub	6–10			X	X	
	Dogwood, pagoda	Shrub	10–15			X	X	
	Dogwood, redosier	Shrub	3–9					
	Dogwood, roundleaf	Shrub	3–9			X	X	X
	Dogwood, silky	Shrub	6–10		X	X	X	
	Elder, American	Shrub	3–10			X	X	X
	Filbert (hazelnut)	Shrub	5–8			X	X	
	Forsythia	Shrub	4–8	X				
	Grape, wild	Vine				X	X	X
	Hawthorn or thornapple	Shrub	5–15			X	X	
	Honeysuckle (shrub types).	Shrub	6–12	X	X	X		
	Juniper, creeping	Shrub	1–2	X		X	X	X
	Juniper, Pfitzer	Shrub	8–10	X		X		
	Lilac	Shrub	8–10	X	X		X	
	Maple, Amur	Shrub	1	X	X			
	Mockorange	Shrub	6–9	X	X			
	Myrtle or periwinkle	Vine	1	X			X	X
	Ninebark, common	Shrub	6–9	X	X		X	
	Peashrub, Siberian	Shrub	10–15		X	X	X	
	Pine, mugho	Shrub	6–9	X		X		
	Plum, American	Shrub	10–15			X	X	
	Privet, Amur	Shrub	10		X	X		
	Privet, Regels border	Shrub	6–9		X	X		
	Redcedar, eastern	Shrub	6–9		X	X	X	
	Rose, rugosa and horticultural varieties.	Shrub	2–6	X		X	X	
	Russian-olive	Shrub	15+	X	X	X		
	Snowberry	Shrub	3–4	X		X	X	X
	Spirea, Anthony Waterer	Shrub	2–3	X				
	Spirea, Vanhoutte	Shrub	5–6	X	X			
	Sumac, fragrant	Shrub	3	X		X	X	X
	Sumac, smooth	Shrub	6–10			X	X	
	Sumac, staghorn	Shrub	10–15			X	X	
	Viburnum, American cranberry bush.	Shrub	7–9	X	X	X	X	
	Viburnum, arrowwood	Shrub	10–12	X	X	X		
	Viburnum, blackhaw	Shrub	8–10		X	X	X	
	Viburnum, mapleleaf	Shrub	3–5			X	X	
	Viburnum, nannyberry	Shrub	9–12		X	X	X	
	Viburnum, Rafinesque	Shrub	2–4			X	X	
	Viburnum, wayfaringtree	Shrub	4–9	X		X	X	
	Virginia creeper	Vine				X	X	X
	Wahoo, eastern	Shrub	4–9	X		X	X	
	Weigela	Shrub	4–8	X	X			
	Willows, shrubby types including pussywillow.	Shrub	2–8	X	X	X	X	
	Winterberry, common	Shrub	6–9			X	X	
	Yew, shrub type	Shrub	3–10	X		X		

TABLE 5.—*Shrubs and vines suited to the soils*—Continued

Tree and shrub group and map symbols	Common name	Type of plant	Potential height	Suitable for—				
				Landscaping	Hedge, screen, and windbreak	Wildlife food and cover	Roadside planting	Ground cover
			Feet					
Group 2:	Arborvitae (shrub type)	Shrub	3–7	X	X	X		
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

TABLE 5.—*Shrubs and vines suited to the soils*—Continued

Tree and shrub group and map symbols	Common name	Type of plant	Potential height	Suitable for—				
				Landscaping	Hedge, screen, and windbreak	Wildlife food and cover	Roadside planting	Ground cover
			Feet					
Group 3:	Arborvitae (shrub type)	Shrub	3–7	X	X	X		
Somewhat poorly drained to very poorly drained mineral soils:	Autumn-olive	Shrub	10–15	X	X	X		
	Bayberry or waxmyrtle	Shrub	5–9	X		X		X
Af, Au, Cb, Cu, De, Eo, Er, FmA, FmB, FoA, FoB, HkB, (Kert part only), KeA, La, Mc, Mo, Na, On, Or, So, Vd, Ve.	Dogwood, gray	Shrub	6–10			X	X	
	Dogwood, pagoda	Shrub	10–15			X	X	
	Dogwood, redosier	Shrub	3–9					
	Dogwood, roundleaf	Shrub	3–9			X	X	X
	Dogwood, silky	Shrub	6–10		X	X	X	
	Elder, American	Shrub	3–10			X	X	X

lands are left in their natural condition in the county. This has had an effect upon the species of wildlife remaining in the county.

outdoors. These areas are subject to heavy foot traffic. Most of the vehicular traffic, however, is confined to access roads. The best soils are firm when wet but not

TABLE 6.—*Soil interpretations*

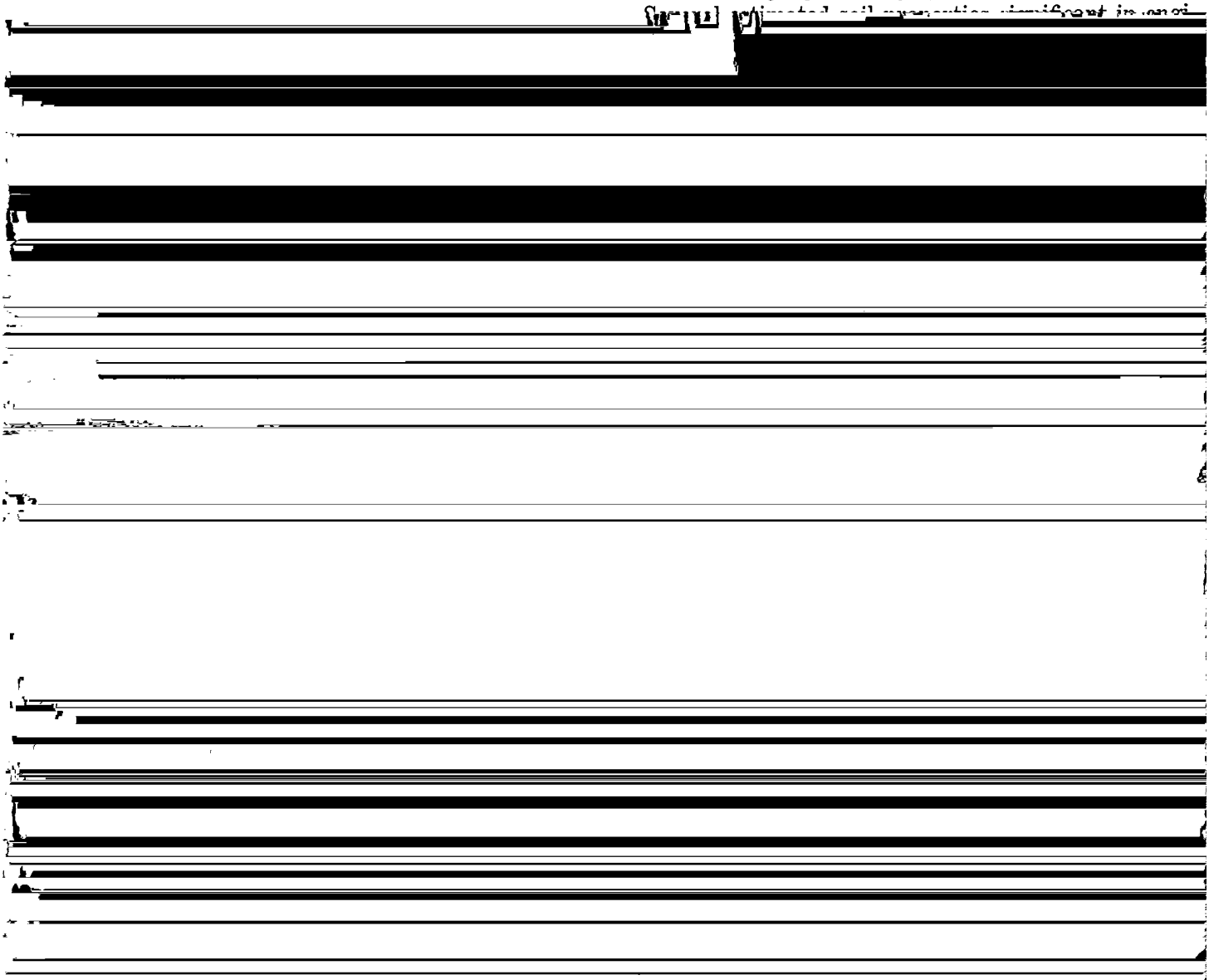
[redacted]	[redacted]	[redacted]	[redacted]

for elements of wildlife habitat

Woody plants		Wetland plants for food and cover	Shallow and deep water developments
Hardwood trees and shrubs	Coniferous trees		
Good if slopes are 0 to 20 percent; fair if slopes are more than 20 percent	Good if slopes are 0 to 20 percent; fair if slopes are more than 20 percent	Poor if slopes are 0 to 2 percent; unsuitable if slopes are more than 2 percent; few	Poor if slopes are 0 to 2 percent; unsuitable if slopes are more than 2 percent; mod-

tribution, liquid limit, and plasticity index. In group A–1 are gravelly soils that have high bearing strength and are the best soils for subgrade (foundation). At the other extreme, in group A–7, are clay soils that have low strength when wet and are the poorest soils for subgrade. Where laboratory data are available to justify a further breakdown, the A–1, A–2, and A–7 groups are divided as follows: A–1–a, A–1–b, A–2–4, A–2–5, A–2–6, A–2–7, A–7–5, and A–7–6. As additional refinement the engineering value of a soil material can be indicated by a group index number. Group indices range from 0 for the best material to 20 or more for the poorest. The AASHTO classification for tested soils with group index numbers in parentheses, is shown in table 11; the estimated classification, without group index numbers, is given in table 9 for all soils mapped in the survey area.

Estimated soil properties significant to engineering



for representative soil profiles by layers sufficiently different to have different significance for soil engi-

TABLE 7.—*Importance of elements of wildlife habitat for selected kinds of wildlife*

[Habitat elements are rated: 1, of little or no value; 2, of some value; 3, important; 4, very important; 5, of key or critical necessity for survival. Absence of a figure in a column indicates element is not applicable]

Selected wildlife species	Grain and seed crops		Grasses and legumes		Wild herbaceous upland plants	Woody plants			Wetland plants for food and cover	Shallow water	Deep water
						Hardwood		Coniferous trees			
	Harvested	Unharvested	Harvested	Unharvested		Shrubs	Trees				
Migratory waterfowl:											
Ducks	3	3	1	3	3		1		5	5	4
Geese	4	5	4	1					2	3	3
Upland game birds:											
Hungarian partridge	4	4	3	4	4	1			1		
Pheasant	4	4		5	5	4		1	5	3	
Quail	4	4	2	4	4	5	2	1	4	3	
Woodcock			1	3	3	4	4	2	3		
Small game:											
Cottontail	3	4	3	5	5	5	3	1	2	3	
Raccoon	3	4		1	1	2	4		1	5	4
Squirrels, fox and gray	3	4		1	1	2	5	1			
Large game:											
Deer	3	4	3	3	4	4	4	4	3	3	2
Furbearers:											
Beaver						4	5		4	4	5
Fox, red [1]	2	3	2	3	3	3	2	1	3	3	1
Mink [1]						2	1	1	3	5	5
Muskrat	1	1				1			4	5	5

[1] Carnivorous species not strictly dependent on elements listed.

of those soil characteristics observed in the field, particularly structure and texture. The estimates in table 9 do not take into account lateral seepage or such transient soil features as plowpans and surface crusts.

Available water capacity is the ability of soils to hold water for use by most plants. It is commonly defined as the difference between the amount of water in the soil at field capacity and the amount at the wilting point of most crops.

Reaction is the degree of acidity or alkalinity of a soil, expressed in pH value. The pH value and terms used to describe soil reaction are explained in the Glossary.

Shrink swell potential is the relative change in volume to be expected in soil material with changes in soil material. Corrosivity of concrete is influenced mainly by the content of sodium or magnesium sulfate, but it is also influenced by soil texture and acidity. Installations of uncoated steel that intersect soil boundaries or soil horizons are more susceptible to corrosion than installations entirely in one kind of soil or in one soil horizon. In most such construction projects as backfilling a trench, driving a piling, or covering a conduit, the steel will come in contact with the soil material of more than one horizon. Thus, the potential for corrosion of uncoated steel is increased. A corrosivity rating of *low* means that there is a low probability of soil induced corrosion damage. A rating of *high* means that there is a high probability of damage so that protective measures for steel and

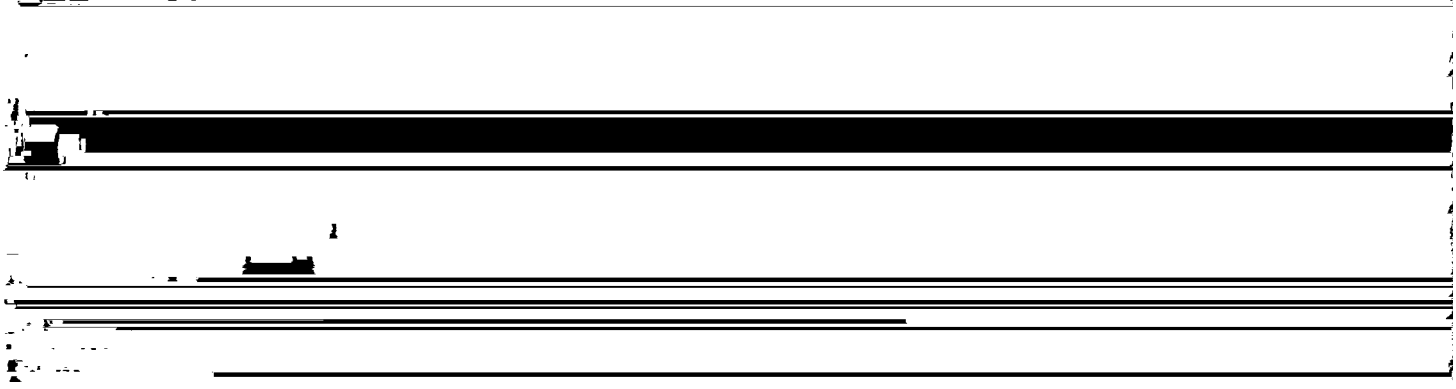


TABLE 8.—*Degree and kind of*

Recreation groups and map symbols	Camp areas [1]	Picnic areas
Group 1: Deep to moderately deep, well drained to somewhat excessively drained loams, silt loams, and very fine sandy loams: DaA, FpB, FpC, GaB, GaC2, GaD2, GaE, HeC2, HnB, HnC2, HnD2, MeA, MeB, MeC2, MmA, MrB, MrC2, Ms, NrC2, NrD2, NrE2, OsB, OsC2, PcB, SeB, SeC2, SeD2, SeE2, SfB, SmA, SmB, TeA, TeB, UnD2, UnE, Wh.	Moderate if slopes are 0 to 12 percent; severe if slopes are more than 12 percent; erodible where soil slopes; compacts easily; wet and soft after rain.	Slight if slopes are 0 to 6 percent; moderate if slopes are 6 to 12 percent; severe if slopes are more than 12 percent; erodible on slopes; compacts easily when wet.
Group 2: Moderately deep, moderately well drained to somewhat excessively drained sandy loams and loamy sands: AtB, AtC2, AtD2, BlB, BlC2, BlD2, BmA, DuA, ElB, ElC2, ElD2, LuB, LuC.	Slight if slopes are 0 to 6 percent; moderate if slopes are 6 to 12 percent; severe if slopes are more than 12 percent; erodible where soil slopes.	Slight if slopes are 0 to 6 percent; moderate if slopes are 6 to 12 percent; severe if slopes are more than 12 percent; erodible on slopes.
Group 3: Shallow, well drained and somewhat excessively drained soils: BuA, CeA, CkB, CkC2, CkD2, EmB, EmC2, EmD2, EmE, NtB, NtC2, NtD2, NtE2, NtF.	Slight if slopes are 0 to 6 percent; moderate if slopes are 6 to 12 percent; severe if slopes are more than 12 percent; erodible on slopes.	Slight if slopes are 0 to 6 percent; moderate if slopes are 6 to 12 percent; severe if slopes are more than 12 percent; erodible on slopes.
Group 4:	Moderate if slopes are 0 to 6 per-	Moderate if slopes are 0 to 6 per-

limitations for recreational uses

Playgrounds [1]	Paths and trails	Golf course fairways
Moderate if slopes are 0 to 6 percent; severe if slopes are more than 6 percent;	Moderate if slopes are 0 to 12 percent; severe if slopes are more than 12 percent;	Slight if slopes are 0 to 6 percent; moderate if slopes are 6 to 12 percent; severe if

TABLE 9.—*Estimated soil properties*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in such
Absence of data indicates that the soil is too variable to be rated or that no estimate

Soil series and map symbols	Depth to—		Depth from surface	USDA texture	Classification		Coarse fraction greater than 3 inches
	Bedrock	Seasonal high water table			Unified	AASHTO	
	Feet	*Feet*	*Inches*				*Percent*
Adrian: Ad	>5	0–1	0–36	Muck	Pt		0
			36–60	Sand	SP or SP–SM	A–3	0
Alluvial land, sandy: Ae Most properties are too variable to be rated.							
Alluvial land, wet: Af Most properties are too variable to be rated.							
Arenzville: ArA	>5	[3] 3–5	0–8	Silt loam	ML	A–4	0
			8–60	Silt loam	ML or CL	A–4 or A–6	0
Arland: AtB, AtC2, AtD2	1½–3½	>5	0–13	Sandy loam	SM	A–2 or A–4	0
			13–34	Sandy loam	SM	A–2 or A–4	0
			34–40	Loamy sand	SM	A–2	0
			40–60	Sandstone.			
Au Gres: Au	>5	1–3	0–60	Sand	SP	A–3	0
Billett: BlB, BlC2, BlD2, BmA [4]	>5	>5	0–8	Sandy loam	SM	A–2 or A–4	0
			8–34	Sandy loam	SM	A–2	0
			34–60	Sand	SP–SM	A–3	0
*Boone: BoB, BoC, BoE For Plainbo parts, see Plainbo series.	1½–3½	>5	0–26	Sand	SP–SM	A–3	0
			26–60	Sandstone.			
Burkhardt: BuA	>5	>5	0–10	Sandy loam	SM	A–2	0
			10–16	Sandy loam	SM	A–2	0
			16–60	Sand and gravel	SP	A–1	0–10
Cable: Cb	>5	0–1	0–8	Loam	ML	A–4	0
			8–15	Sandy loam	SM	A–2	0
			15–36	Loam	ML or CL	A–4	0
			36–60	Sandy loam	SM	A–2 or A–4	0
Caryville: CeA	>5	[3] >5	0–16	Loam	ML	A–4	0
			16–24	Loamy sand	SM	A–2	0
			24–60	Sand	SP–SM or SM	A–3 or A–2	0
Chetek: CkB, CkC2, CkD2	>5	>5	0–10	Sandy loam	SM	A–2	0
			10–16	Sandy loam	SM or ML	A–2 or A–4	0
			16–60	Sand and gravel	SP	A–1 or A–3	0–10
Curran: Cu	>5	1–3	0–17	Silt loam	ML	A–4	0
			17–34	Heavy silt loam	ML or CL	A–4	0
			34–44	Silt loam	ML	A–4	0
			44–60	Medium and fine sand.	SP–SM or SM	A–2 or A–3	0
Dakota: DaA	>5	>5	0–16	Loam	ML	A–4	0
			16–30	Loam	ML or CL	A–4	0
			30–60	Sand	SP	A–3	0
Dells: De	>5	1–3	0–16	Silt loam	ML	A–4	0
			16–31	Silt loam	CL	A–6	0
			31–35	Loam	SC–SM, SM, ML, or CL–ML	A–4	0
			35–60	Sand	SP–SM	A–3 or A–1	0

See footnotes at end of table.

significant to engineering

mapping units may have different properties, and for this reason it is necessary to follow carefully the instructions for referring to another series. was made. The symbol > means greater than; the symbol < means less than]

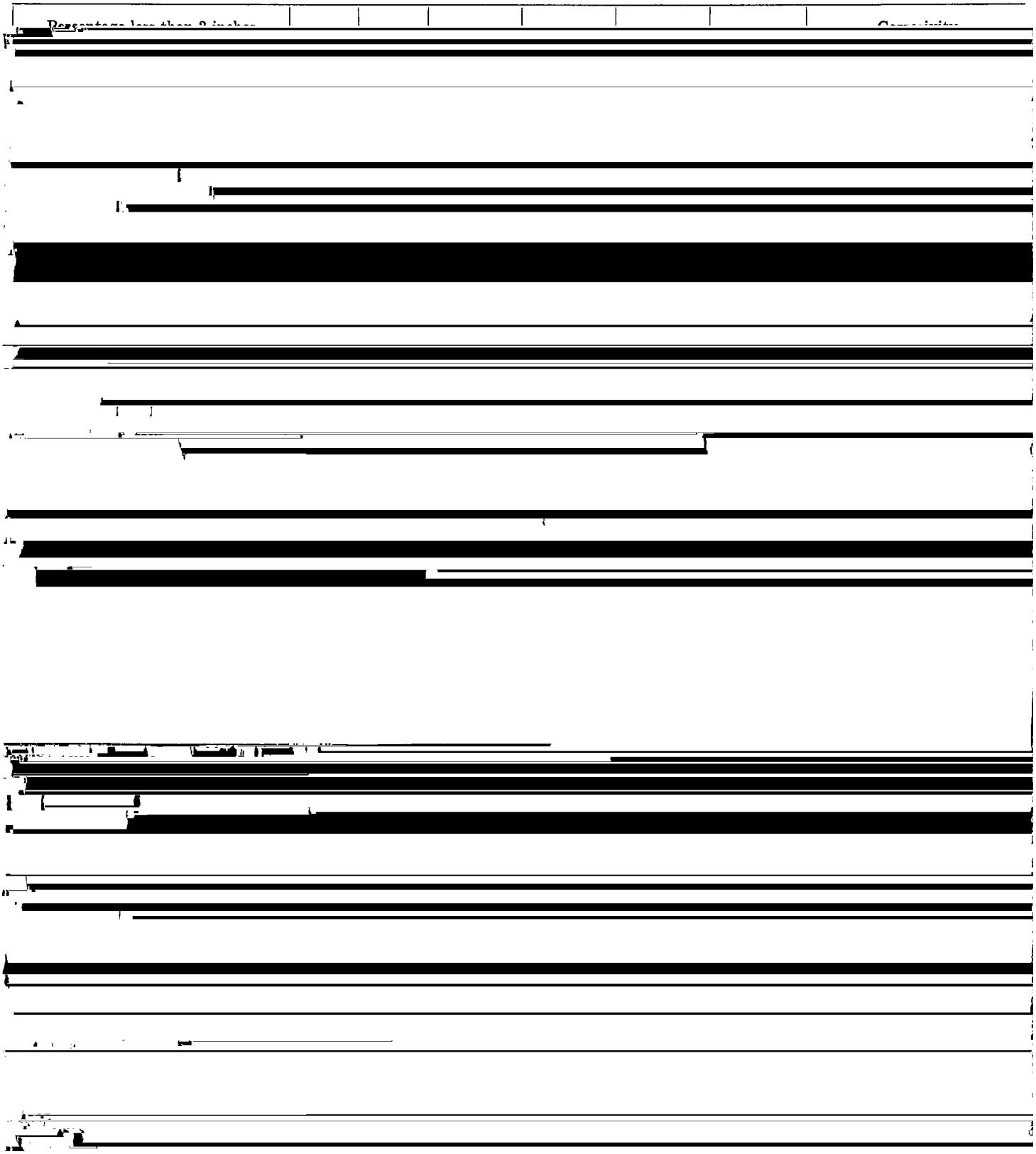


TABLE 9.—*Estimated soil properties*

Soil series and map symbols	Depth to—		Depth from surface	USDA texture	Classification		Coarse fraction greater than 3 inches
	Bedrock	Seasonal high water table			Unified	AASHTO	
	Feet	*Feet*	*Inches*				*Percent*
Dunnville: DuA	>5	>5	0–12	Sandy loam	SM	A–2	0
			12–25	Sandy loam	SM	A–2 or A–4	0
			25–30	Loamy sand	SM	A–2	0
			30–60	Sand	SP	A–3	0
Eleva: EIB, EIC2, EID2	1½–3½	>5	0–9	Sandy loam	SM	A–2	0
			9–25	Light loam and sandy loam.	SM	A–2	0
			25–28	Sand	SP	A–3	0
			28–60	Sandstone.			
Elkmound: EmB, EmC2, EmD2, EmE	1–2	>5	0–12	Loam	CL–ML or ML	A–4	0
			12–60	Sandstone.			
Elm Lake: Eo	1½–3½	0–1	0–7	Loamy sand	SM or SP–SM	A–2 or A–3	0
			7–27	Sand	SP or SP–SM	A–3	0
			27–36	Loam	CL	A–6	0
			36–60	Sandstone.			
Ettrick: Er	>5	[3] 0–1	0–12	Silt loam	ML or CL–ML	A–4	0
			12–26	Silty clay loam	CL or ML	A–7	0
			26–32	Silt loam	CL or ML	A–4	0
			32–60	Silt and very fine sand.	ML	A–4	0
*Fairchild: FmA, FmB For Merrillan parts, see Merrillan series.	1½–3½	1–3	0–10	Loamy sand	SM	A–2	0
			10–19	Loamy fine sand	SM	A–2	0
			19–33	Sand	SP–SM	A–3	0
			33–40	Loam	ML	A–4	0
			40–60	Sandstone and shale.			
Fallcreek: FoA, FoB	>5	1–3	0–16	Sandy loam	SM	A–4 or A–2	0
			16–42	Loam	CL or SC	A–6	0
			42–60	Loam	CL, CL–ML, SC, or SM–SC	A–4	0–3
Fallcreek variant: FpB, FpC	>5	3–5	0–8	Loam	ML or CL–ML	A–4	0–10
			8–30	Loam	ML or CL	A–4	0
			30–60	Heavy loam	CL	A–6	0
Friendship: FrA	>5	3–5	0–18	Loamy sand	SM	A–1	0
			18–60	Sand	SP–SM	A–1	0
Gale: GaB, GaC2, GaD2, GaE	1½–3½	>5	0–13	Silt loam	ML or CL–ML	A–4	0
			13–26	Heavy silt loam	CL	A–6	0
			26–31	Loam	CL or ML	A–4	0
			31–38	Sand	SP	A–3	0
			38–60	Sandstone.			
Gotham:							
GoB, GoC2	>5	>5	0–8	Loamy sand	SM	A–1	0
			8–28	Loamy fine sand	SM	A–1	0
			28–60	Sand	SM or SP–SM	A–1 or A–2	0
GsB, GsC2	3–5	>5	0–8	Loamy sand	SM	A–1	0
			8–28	Loamy fine sand	SM	A–1	0
			28–40	Sand	SM or SP–SM	A–1 or A–2	0
			40–60	Sandstone.			

See footnotes at end of table.

significant to engineering—Continued

Percentage less than 3 inches passing sieve—				Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction [1]	Shrink-swell potential	Corrosivity	
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)							Uncoated steel	Concrete
						Inches per hour	*Inches per inch of soil*	*pH value*			
100	100	75–85	25–35	>20	NP–5	2.0–6.0	0.13–0.18	5.6–6.0	Low	Low	Moderate.
100	100	65–75	30–40		NP–5	2.0–6.0	0.13–0.14	5.6–6.0	Low	Low	Moderate.
100	100	60–80	15–25		NP	2.0–6.0	0.12–0.19	5.6–6.0	Low	Low	Moderate.
100	100	60–70	1–30		NP	2.0–6.0	0.05–0.07	5.6–6.0	Low	Low	Moderate.
100	100	75–85	25–35	10–20	2–4	0.6–2.0	0.13–0.15	5.6–6.5	Low	Low	Moderate.
100	100	75–85	25–35	10–20	2–4	0.6–2.0	0.13–0.15	4.5–6.0	Low	Low	High.
100	100	60–70	1–5		NP	2.0–6.0	0.06–0.08	5.1–5.5	Low	Low	High.
100	100	70–90	60–70	10–20	2–6	0.6–2.0	0.20–0.22	5.1–6.5	Low	Low	Moderate.
100	100	80–90	5–10		NP	2.0–6.0	0.09–0.11	4.5–5.5	Low	Moderate	High.
100	100	51–60	5–10		NP	2.0–6.0	0.07–0.09	5.6–6.0	Low	Moderate	Moderate.
100	85–95	75–85	70–80	30–40	15–35	0.06–0.2	0.18–0.20	4.5–5.0	Moderate	High	High.
100	100	95–100	80–100	10–25	2–4	0.6–2.0	0.22–0.24	5.6–6.5	Moderate	Moderate	Low.
100	100	95–100	80–100	41–50	15–25	0.2–0.6	0.18–0.20	6.1–6.5	Moderate	Moderate	Low.
100	100	95–100	90–100	20–30	5–10	0.6–2.0	0.20–0.22	6.1–6.5	Low	Moderate	Low.
100	100	85–90	60–70	10–25	1–4	0.6–2.0	0.17–0.19	6.6–7.3	Low	Low	Low.
100	100	50–60	15–20		NP	6.0–20.0	0.10–0.12	4.5–5.0	Low	High	High.
100	100	50–60	15–20		NP	6.0–20.0	0.09–0.11	5.1–5.5	Low	High	High.
100	100	70–80	5–10		NP	6.0–20.0	0.06–0.08	5.6–6.0	Low	Moderate	Moderate.
100	100	85–95	60–70	10–30	2–4	0.2–0.6	0.17–0.19	4.5–5.0	Low	High	High.
95–100	95–100	75–85	30–40	10–20	2–4	2.0–6.0	0.15–0.17	5.1–6.0	Low	Moderate	High.
95–100	90–100	80–90	45–60	25–35	10–20	0.2–0.6	0.17–0.18	4.5–5.5	Low	Moderate	High.
95–100	90–100	65–75	40–55	20–30	5–10	0.2–0.6	0.12–0.16	6.1–6.5	Low	Moderate	Moderate.
85–100	85–100	85–95	60–75	25–35	2–8	0.6–2.0	0.20–0.22	6.1–6.5	Low	Moderate	Low.
80–100	85–100	85–95	60–75	25–35	5–10	0.2–0.6	0.17–0.19	5.1–6.0	Low	Moderate	Moderate.
90–100	85–100	85–95	60–80	25–40	11–15	0.2–0.6	0.17–0.19	5.1–6.0	Moderate	Moderate	Moderate.
100	100	30–40	10–20		NP	6.0–20.0	0.10–0.12	5.6–6.0	Low	Low	Moderate.
100	100	25–35	5–10		NP	6.0–20.0	0.06–0.08	5.1–5.5	Low	Moderate	High.
100	100	90–100	80–95	25–35	2–8	0.6–2.0	0.22–0.24	5.6–6.5	Low	Moderate	Low.
100	100	90–100	85–95	25–35	11–15	0.6–2.0	0.18–0.20	5.1–5.5	Low	Moderate	Moderate.
100	100	90–100	60–75	20–30	5–10	0.6–2.0	0.17–0.19	5.1–5.5	Low	Moderate	Moderate.
100	100	60–70	1–5		NP	6.0–20.0	0.05–0.07	5.6–6.0	Low	Low	Moderate.
100	100	40–50	15–25		NP	6.0–20.0	0.10–0.12	6.1–6.5	Low	Low	Moderate.
100	100	40–50	15–25		NP	6.0–20.0	0.10–0.12	6.1–6.5	Low	Low	Moderate.
100	100	40–60	10–30		NP	6.0–20.0	0.07–0.14	6.1–6.5	Low	Low	Moderate.
100	100	40–50	15–25		NP	6.0–20.0	0.10–0.12	6.1–6.5	Low	Low	Moderate.
100	100	40–50	15–25		NP	6.0–20.0	0.10–0.11	6.1–6.5	Low	Low	Moderate.
100	100	40–60	10–30		NP	6.0–20.0	0.07–0.14	6.1–6.5	Low	Low	Moderate.

TABLE 9.—*Estimated soil properties*

Soil series and map symbols	Depth to—		Depth from surface	USDA texture	Classification		Coarse fraction greater than 3 inches
	Bedrock	Seasonal high water table			Unified	AASHTO	
	Feet	*Feet*	*Inches*				*Percent*
*Hiles: HeC2, HkB	1½–3½	3–5	0–8	Silt loam	ML	A–4	0
			8–22	Silt loam	CL or CL–ML	A–4	0
For Kert part of HkB, see Kert series.			22–27	Silty clay loam	CL	A–6	0
			27–60	Sandstone and shale.			
Hixton: HnB, HnC2, HnD2	1½–3½	>5	0–15	Loam	ML or CL–ML	A–4	0
			15–23	Loam	ML or CL–ML	A–4	0
			23–27	Sandy loam	SM	A–2 or A–4	0
			27–36	Sand	SP	A–3	0
			36–60	Sandstone.			
Houghton: Ho	>5	0–1	0–60	Muck	Pt		0
Humbird	1½–3½	3–5	0–31	Sandy loam	SM	A–2 or A–4	0
			31–38	Silty clay	CL	A–7	0
Mapped only with Ludington soils.			38–60	Sandstone and shale.			
Kert: KeA	1½–3½	1–3	0–15	Loam	ML or CL–ML	A–4	0
			15–28	Heavy loam	CL	A–6	0
			28–36	Sandy loam	SM or SC–SM	A–2 or A–4	0
			36–60	Sandstone and shale.			
Lows: La	>5	0–1	0–28	Loam	ML or CL–ML	A–4	0
			28–60	Sand	SP	A–3	0
*Ludington: LuB, LuC	1½–3½	3–5	0–18	Loamy sand	SM	A–2 or A–1	0
			18–26	Sand	SP–SM	A–1	0
For Humbird parts, see Humbird series.			26–35	Loam	ML or CL–ML	A–4	0
			35–60	Sandstone and shale.			
Markey: Ma	>5	0–1	0–30	Muck	Pt		0
			30–60	Sand	SP	A–3	0
Marshan: Mc	>5	0–1	0–16	Loam	ML	A–4	0
			16–26	Loam	ML or CL	A–4 or A–6	0
			26–34	Silt loam	ML or CL	A–4 or A–6	0
			34–38	Sandy loam	SM	A–2 or A–4	0
			38–60	Sand	SP	A–3	0
Menahga: MdB, MdC	>5	>5	0–60	Sand	SP	A–3	0
Meridian: MeA, MeB, MeC2, MmA [4]	>5	>5	0–30	Loam	ML	A–4	0
			30–60	Sand	SP	A–3	0
Merrillan	1½–3½	1–3	0–13	Sandy loam	SM	A–2 or A–4	0
			13–18	Loamy sand	SM	A–2	0
Mapped only with Fairchild soils.			18–23	Heavy loam	CL	A–4 or A–6	0
			23–30	Silty clay loam	CL	A–6 or A–7	0
			30–60	Sandstone and shale.			
Morocco: Mo	>5	1–3	0–16	Loamy sand	SM	A–2	0
			16–60	Sand	SP	A–3	0
Mt. Carroll: MrB, MrC2 [5], Ms [6]	>5	>5	0–9	Silt loam	ML	A–4	0
			9–44	Silt loam	CL	A–6	0
			44–60	Silt loam	ML or CL	A–4 or A–6	0

See footnotes at end of table.

significant to engineering—Continued

Percentage less than 3 inches passing sieve—				Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction [1]	Shrink-swell potential	Corrosivity	
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)							Uncoated steel	Concrete
						Inches per hour	*Inches per inch of soil*	*pH value*			
100	100	80–90	65–75	20–30	2–4	0.6–2.0	0.22–0.24	5.1–5.5	Low	Moderate	Moderate.
100	100	80–90	65–75	20–30	5–10	0.6–2.0	0.20–0.22	4.5–5.0	Low	Moderate	High.
100	90–95	75–85	50–60	25–35	11–15	0.06–0.2	0.18–0.20	4.5–5.0	Moderate	Moderate	High.
100	100	75–90	55–65	15–25	1–5	0.6–2.0	0.20–0.22	6.1–6.5	Low	Low	Low.
100	100	75–90	55–70	20–30	2–8	0.6–2.0	0.18–0.20	5.1–5.5	Low	Low	Moderate.
100	100	60–70	30–40	15–25	1–4	2.0–6.0	0.12–0.14	5.1–5.5	Low	Low	High.
100	100	60–70	1–5		NP	6.0–20.0	0.05–0.07	5.1–5.5	Low	Low	High.
						6.0–20.0	0.35–0.45	5.6–6.5		High	Moderate.
100	100	60–70	30–40	10–20	2–6	0.6–2.0	0.10–0.16	4.5–5.5	Low	Moderate	High.
100	100	90–100	85–95	40–50	20–30	0.2–0.6	0.18–0.20	4.5–5.0	Moderate	High	High.
100	100	85–95	55–65	20–35	2–8	0.6–2.0	0.18–0.22	4.5–6.5	Low	High	High.
100	100	80–90	55–75	25–35	11–15	0.2–0.6	0.17–0.19	4.5–5.0	Low	High	High.
100	100	65–75	30–40	15–25	3–7	0.6–2.0	0.11–0.13	4.5–5.0	Low	High	High.

TABLE 9.—*Estimated soil properties*

Soil series and map symbols	Depth to—		Depth from surface	USDA texture	Classification		Coarse fraction greater than 3 inches
	Bedrock	Seasonal high water table			Unified	AASHTO	
	Feet	*Feet*	*Inches*				*Percent*
Newson: Na	>5	0–1	0–9	Loamy sand	SM or SP–SM	A–2	0
			9–60	Sand	SP–SM or SM	A–3	0
Norden: NrC2, NrD2, NrE2	1½–3½	>5	0–14	Silt loam	ML or CL	A–4 or A–6	0
			14–24	Loam	CL	A–4 or A–6	0
			24–30	Very fine sandy loam.	ML, CL–ML, SM, or SC–SM	A–4 or A–2	0
			30–60	Sandstone.			
Northfield: NtB, NtC2, NtD2, NtE2, NtF	1–2	>5	0–7	Silt loam	ML	A–4	0
			7–16	Heavy silt loam	ML or CL	A–4 or A–6	0
			16	Sandstone.			
Orion: On	>5	[3] 1–3	0–60	Silt loam	ML or CL	A–4 or A–6	0
Otter: Or	>5	[3] 0–1	0–60	Silt loam	ML or CL	A–4 or A–6	0
Otterholt: OsB, OsC2	>5	>5	0–56	Silt loam	ML or CL	A–4 or A–6	0
			56–60	Fine sandy loam	SM or SC–SM	A–4	0
Pillot: PcB	>5	>5	0–16	Silt loam	ML	A–4	0
			16–34	Heavy silt loam	ML or CL	A–4 or A–6	0
			34–38	Sandy loam	SM	A–2 or A–4	0
			38–60	Sand	SP	A–3	0
Plainbo: PdB, PdC2	1–5	>5	0–13	Loamy sand	SM	A–2	0
			13–29	Sand	SP or SP–SM	A–3	0
			29–60	Sandstone.			
Plainfield:							
PfB, PfC2	>5	>5	0–15	Loamy sand	SM	A–2	0
			15–60	Sand	SP	A–3	0
PlB, PlC2	>5	>5	0–15	Loamy sand	SM	A–2	0
			15–40	Sand	SP	A–3	0
			40–55	Sandy loam	SM	A–2	0
			55–60	Sand	SP	A–3	0
Riverwash: Re							
Most properties are too variable to be rated.							
Seaton: SeB, SeC2, SeD2, SeE2,[5] SfB,[6] SmA,[6] SmB.[6]	>5	>5	0–12	Silt loam	ML	A–4	0
			12–34	Heavy silt loam	CL	A–4 or A–6	0
			34–60	Silt loam	ML or CL	A–4	0
Shiffer: So	>5	1–3	0–8	Loam	ML	A–4	0
			8–30	Loam	CL	A–4 or A–6	0
			30–60	Sand	SP–SM or SM	A–2 or A–3	0
Sparta: SpB	>5	>5	0–24	Loamy sand	SM or SP–SM	A–2	0
			24–60	Sand	SP	A–3	0
Tell: TeA, TeB	>5	>5	0–10	Silt loam	ML or CL–ML	A–4	0
			10–30	Heavy silt loam	ML or CL	A–4 or A–6	0
			30–34	Loam	ML or CL	A–4	0
			34–60	Sand	SP	A–3	0
Terrace escarpments, sandy: Tn							
Most properties are too variable to be							

significant to engineering—Continued

Percentage less than 3 inches passing sieve—				Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction [1]	Shrink-swell potential	Corrosivity	
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)							Uncoated steel	Concrete
						Inches per hour	*Inches per inch of soil*	*pH value*			
100	90–100	51–60	10–20	-------	NP	6.0–20.0	0.10–0.12	5.1–5.5	Low------	Moderate--	High.
100	90–100	51–60	5–15	-------	NP	6.0–20.0	0.05–0.08	5.1–5.5	Low------	Moderate--	High.
100	95–100	75–85	55–85	20–30	3–12	0.6–2.0	0.22–0.24	5.1–6.5	Low------	Low------	Low.
100	95–100	90–100	55–80	25–35	10–25	0.6–2.0	0.16–0.20	5.1–5.5	Low------	Low------	Moderate.
100	95–100	85–95	20–55	10–20	1–7	0.6–2.0	0.16–0.19	5.6–6.0	Low------	Low------	Moderate.
100	95–100	80–95	75–90	15–25	1–4	0.6–2.0	0.22–0.24	6.1–6.5	Low------	Low------	Low.
100	90–100	75–90	70–90	25–35	5–12	0.6–2.0	0.20–0.22	6.1–6.5	Low------	Low------	Low.
100	100	80–90	80–90	25–35	2–12	0.6–2.0	0.20–0.22	5.6–6.5	Low------	High------	Low.
100	95–100	90–100	90–100	25–35	2–12	0.6–2.0	0.20–0.22	5.6–6.5	Low------	High------	Low.
100	100	90–100	70–95	30–40	3–12	0.6–2.0	0.20–0.22	4.5–7.3	Low------	Low------	High.
100	100	80–90	36–45	15–25	2–8	0.6–2.0	0.14–0.16	5.6–6.0	Low------	Low------	Moderate.
100	100	90–100	85–95	20–30	2–4	0.6–2.0	0.20–0.24	5.1–7.3	Low------	Low------	Moderate.
100	100	90–100	85–95	25–35	5–12	0.6–2.0	0.18–0.20	5.1–5.5	Low------	Low------	Moderate.
100	100	60–70	30–40	10–20	1–4	2.0–6.0	0.12–0.14	5.1–5.5	Low------	Low------	High.
100	100	51–70	2–5	-------	NP	6.0–20.0	0.05–0.07	5.6–6.0	Low------	Low------	Moderate.
100	100	50–85	20–25	-------	NP	6.0–20.0	0.10–0.12	5.1–6.0	Low------	Low------	Moderate.
100	100	60–70	2–10	-------	NP	6.0–20.0	0.06–0.08	5.1–6.0	Low------	Low------	Moderate.
100	100	50–70	20–25	-------	NP	6.0–20.0	0.10–0.12	5.1–5.5	Low------	Low------	High.
100	100	55–60	1–4	-------	NP	6.0–20.0	0.06–0.08	5.6–6.0	Low------	Low------	Moderate.
100	100	50–70	20–25	-------	NP	6.0–20.0	0.10–0.12	5.1–5.5	Low------	Low------	High.
100	100	55–60	1–4	-------	NP	6.0–20.0	0.05–0.07	5.6–6.0	Low------	Low------	Moderate.
100	100	60–70	20–30	10–20	1–4	2.0–6.0	0.10–0.12	5.6–6.0	Low------	Low------	Moderate.
100	100	55–60	1–4	-------	NP	6.0–20.0	0.05–0.07	5.6–6.0	Low------	Low------	Moderate.
-------	-------	-------	-------	-------	-------	6.0–20.0	0.02–0.09	-------	-------	-------	-------
100	100	95–100	90–100	25–35	2–8	0.6–2.0	0.20–0.24	6.1–6.5	Low------	Low------	Low.
100	100	95–100	90–100	25–35	5–12	0.6–2.0	0.20–0.22	5.1–5.5	Low------	Low------	Moderate.
100	100	95–100	90–100	25–35	2–10	0.6–2.0	0.20–0.22	5.1–5.5	Low------	Low------	Moderate.
100	100	85–95	60–70	30–40	2–8	0.6–2.0	0.20–0.22	6.6–7.3	Low------	Low------	Low.
100	100	85–95	55–70	25–35	8–15	0.6–2.0	0.18–0.20	5.1–7.3	Moderate--	Moderate--	Moderate.
100	100	80–95	5–20	-------	NP	6.0–20.0	0.05–0.07	5.1–5.5	Low------	Moderate--	High.
100	100	60–70	10–20	-------	NP	6.0–20.0	0.12–0.14	5.6–6.0	Low------	Low------	Moderate.
100	100	65–75	1–4	-------	NP	>20.0	0.06–0.08	5.6–6.0	Low------	Low------	Moderate.
100	95–100	90–100	90–100	25–35	2–8	0.6–2.0	0.22–0.24	6.6–7.3	Low------	Moderate--	Low.
100	95–100	90–100	90–100	25–35	6–15	0.6–2.0	0.16–0.20	5.0–7.3	Moderate--	Moderate--	Moderate.
100	95–100	90–100	80–100	25–35	5–10	0.6–2.0	0.16–0.20	5.1–5.5	Low------	Moderate--	Moderate.

[redacted]

significant to engineering—Continued

Percentage less than 3 inches passing sieve—				Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction [1]	Shrink-swell potential	Corrosivity	
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)							Uncoated steel	Concrete
						Inches per hour	*Inches per inch of soil*	*pH value*			
100	95–100	50–75	15–25	--------	NP	6.0–20.0	0.10–0.12	5.1–6.0	Low------	Low------	High.
100	95–100	65–75	5–10	--------	NP	6.0–20.0	0.05–0.07	6.1–6.5	Low------	Low------	Moderate.
100	95–100	85–95	50–65	10–20	2–10	0.6–2.0	0.18–0.22	5.6–6.5	Low------	Low------	Moderate.
100	100	90–100	85–100	25–35	2–8	0.6–2.0	0.22–0.24	5.1–5.5	Low------	High------	Moderate.
100	100	60–70	30–40	15–25	2–6	2.0–6.0	0.12–0.14	4.5–5.0	Low------	High------	High.
100	100	85–95	60–75	25–35	4–10	0.2–0.6	0.17–0.19	4.5–5.0	Low------	High------	High.
100	100	90–100	85–100	25–35	4–10	0.2–0.6	0.20–0.22	5.1–5.5	Low------	High------	Moderate.
100	100	60–70	30–40	15–25	2–4	2.0–6.0	0.12–0.14	4.5–5.0	Low------	High------	High.
100	100	85–95	60–75	25–35	2–8	0.6–2.0	0.20–0.22	5.1–6.0	Low------	Moderate--	Moderate.
100	100	85–95	35–55	15–25	4–8	0.6–2.0	0.17–0.19	5.1–5.5	Low------	Moderate--	Moderate.
100	100	85–95	55–65	25–35	11–15	0.2–0.6	0.17–0.19	5.1–5.5	Low------	Moderate--	Moderate.
100	100	60–80	1–5	NP	NP	>20.0	0.06–0.08	4.5–6.0	Low------	Low------	High.
100	100	90–100	85–100	25–35	2–8	0.6–2.0	0.22–0.24	5.6–6.5	Low------	Low------	Moderate.
100	100	90–100	85–100	25–35	5–14	0.6–2.0	0.18–0.20	5.6–6.5	Low------	Moderate--	Moderate.
100	100	70–85	25–35	25–35	2–6	2.0–6.0	0.12–0.14	5.6–6.0	Low------	Low------	Moderate.
100	100	51–80	1–5	--------	NP	6.0–20.0	0.05–0.07	6.1–6.5	Low------	Low------	Moderate.

[4] Seasonal water table at a depth of 3 to 5 feet for BmA and MmA soils.
[5] Sandstone occurs at a depth below 40 inches in places.
[6] Sand occurs at a depth below 40 inches in places.

at least 3 feet thick, the top of which is within a depth of 5 feet. The ratings do not take into account thickness of overburden, location of the water table, or other factors that affect mining of the materials, and favorable stability, shrink swell potential, shear strength, and compactibility. Presence of stones or organic material in a soil are among factors that are unfavorable.

TABLE 10.—*Engineering interpretations*

[An asterisk in the first column indicates that at least one mapping unit in that series is made up of two or more kinds of soil. The referring to

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements	Sanitary landfill (trench type)	Local roads and streets
Adrian: Ad	Severe: high water table.	Severe: high water table; rapid permeability.	Severe: high water table; organic material and underlying	Severe: high water table; organic material unstable.	Severe: organic material; high water table.	Severe: high water table; organic material.

for town and country planning

soils in such mapping units may have different properties, and for this reason it is necessary to follow carefully the instructions for another series]

Suitability as source of—			Soil features affecting—				
Roadfill	Sand	Topsoil	Pond reservoir areas	Dikes, levees and other embankments	Drainage for crops and pasture	Irrigation	Terraces and diversions
Poor: organic material; high water table.	Poor: variable underlying sand; high water table and organic material hinder excavation.	Surface layer and subsoil poor; organic material; high water table.	Rapid permeability in organic material; rapid permeability in underlying sand; high water table.	Unsuitable organic material; medium shear strength in sand substratum; good compaction characteristics; piping hazard.	High water table; rapid permeability in organic material; rapid permeability in underlying sand; unstable when wet.	High available water capacity; moderately thick organic material over sand; rapid intake rate; very poorly drained; hazard of soil blowing.	Generally not applicable: slopes are 0 to 2 percent; very poorly drained; organic material.
Fair: subject to flooding; seasonal high water table hinders excavation in places.	Fair to poor: variable sand; subject to flooding; high water table hinders excavation in places.	Poor: sandy; subject to flooding.	Rapid permeability; seasonal high water table in places; subject to flooding.	Medium shear strength; good compaction characteristics; piping hazard.	Natural drainage is excessive; subject to flooding.	Very low available water capacity; rapid intake rate; excessively drained; subject to flooding.	Generally not applicable: slopes are 0 to 2 percent; subject to flooding; sandy; difficult to vegetate.
Poor: subject to flooding;	Unsuited: variable soil	Fair to poor: variable soil	Variable soil material and	Variable soil material;	High water table; sub-	Moderate to high avail-	Generally not applicable:

TABLE 10.—*Engineering interpretations for*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank	Sewage	Shallow	Dwellings	Sanitary	Local roads

town and country planning—Continued

Suitability as source of—			Soil features affecting—				
Roadfill	Sand	Topsoil	Pond reservoir areas	Dikes, levees and other embankments	Drainage for crops and pasture	Irrigation	Terraces and diversions
Fair: moderately deep	Poor: some fines; weakly	Poor: slope---	Moderate permeability;	Medium shear strength;	Natural drainage is ade-	Low available water capac-	Slopes of 12 to 20 percent;

TABLE 10.—*Engineering interpretations for*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements	Sanitary landfill (trench type)	Local roads and streets
Boone—Continued BoE For Plainbo part, see Plainbo series.	Severe: slope.	Severe: slope.	Severe: slope; moderately deep to sandstone bedrock.	Severe: slope.	Severe: slope; sandstone bedrock; rapid permeability in substratum.	Severe: slope; depth to sandstone bedrock.
[illegible]	Slight ?	Severe: rapid	Severe: mod	Slight	Severe: sand	Slight

town and country planning—Continued

Suitability as source of—			Soil features affecting—				
Roadfill	Sand	Topsoil	Pond reservoir areas	Dikes, levees and other embankments	Drainage for crops and pasture	Irrigation	Terraces and diversions
Fair to poor: slope hinders excavation; weakly cemented sandstone bedrock.	Good: weakly cemented sandstone bedrock.	Poor: slope; sandy.	Very rapid permeability; weakly cemented sandstone at a depth of 20 to 40 inches; steep.	Medium shear strength; fair to good compaction characteristics; piping hazard; sandstone bedrock at a depth of 20 to 40 inches.	Natural drainage is excessive.	Very low available water capacity; rapid intake rate; excessively drained; moderately deep soil; steep.	Slopes of 12 to 45 percent; sandstone bedrock at a depth of 20 to 40 inches; rock outcrops in places; sandy; difficult to vegetate.
Good	Good: poorly graded sand and gravel.[4]	Fair in surface layer. Poor in subsoil: sandy and gravelly.	Moderately rapid permeability in subsoil; rapid permeability in substratum.	Medium shear strength; fair to good compaction characteristics; piping hazard.	Natural drainage is somewhat excessive.	Low available water capacity; moderately rapid intake rate; somewhat excessively drained; thin soil.	Slopes of 0 to 3 percent; sand and gravel at a depth of 10 to 20 inches.
Poor: high water table.	Poor: high water table.	Poor: high water table.	Moderate permeability; high water table; stones in places.	Medium shear strength; fair to good compaction characteristics; piping hazard.	High water table; moderate permeability; temporary ponding in places; unstable when wet.	Moderate available water capacity; moderate intake rate; poorly drained; deep soil; temporary ponding in places.	Slopes of 0 to 2 percent; poorly drained.
Fair: flooding hinders excavation; pockets of gravel in sand substratum.	Fair: some fines in substratum; pockets of poorly graded gravel in places.	Fair in surface layer: thin. Poor in subsoil: sandy.	Moderate permeability to a depth of about 20 inches; rapid permeability in substratum; subject to flooding.	Medium shear strength; fair to good compaction characteristics; piping hazard.	Well drained; subject to flooding.	Low available water capacity; moderately rapid intake rate; well drained; thin soil; subject to flooding.	Slopes of 0 to 3 percent; sand at a depth of 10 to 20 inches; subject to flooding; difficult to vegetate.
Good	Good: poorly graded sand and gravel.[4]	Fair in surface layer: thin. Poor in subsoil: sandy and gravelly.	Moderately rapid permeability in subsoil; rapid permeability in substratum.	Medium shear strength; fair to good compaction characteristics; piping hazard.	Natural drainage is somewhat excessive.	Low available water capacity; moderately rapid intake rate; somewhat excessively drained; thin soil.	Slopes of 1 to 12 percent; sand and gravel at a depth of 10 to 20 inches.
Fair: slope	Good: poorly graded sand and gravel.[5]	Poor: slope	Moderately rapid permeability in subsoil; rapid permeability in substratum; slope.	Medium shear strength; fair to good compaction characteristics; piping hazard.	Natural drainage is somewhat excessive.	Low available water capacity; moderately rapid intake rate; somewhat excessively drained; thin soil; slope.	Slopes of 12 to 20 percent; sand and gravel at a depth of 10 to 20 inches.

TABLE 10.—*Engineering interpretations for*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements	Sanitary landfill (trench type)	Local roads and streets
Curran: Cu	Severe: seasonal high water table; moderately slow permeability.	Severe: moderately slow permeability; seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table is a concern at times.	Severe: seasonal high water table; susceptible to frost action.
Dakota: DaA	Slight [2]	Severe: rapid permeability in substratum.	Moderate: moderate sidewall stability.	Slight	Severe: rapid permeability in substratum.	Moderate in subsoil; slight in substratum.
Dells: De	Severe: seasonal high water table.	Severe: seasonal high water table; rapid per-	Severe: seasonal high water table.	Severe: seasonal high water table.	Moderate: seasonal high water table; rapid	Severe: seasonal high water table; susceptible

town and country planning—Continued

Suitability as source of—			Soil features affecting—				
Roadfill	Sand	Topsoil	Pond reservoir areas	Dikes, levees and other embankments	Drainage for crops and pasture	Irrigation	Terraces and diversions
Poor: seasonal high water table; susceptible to frost action.	Unsuited	Fair in surface layer: thin. Fair in subsoil: seasonal high water table.	Moderately slow permeability in subsoil; seasonal high water table.	Medium to low shear strength; fair to good compaction characteristics; piping hazard.	Seasonal high water table; moderately slow permeability; unstable when wet.	High available water capacity; slow intake rate; somewhat poorly drained; deep soil.	Slopes of 0 to 2 percent; somewhat poorly drained.
Fair in subsoil; good in substratum.	Good: moderately deep to sand substratum.	Fair in surface layer: thin. Fair in subsoil: thin over sand.	Moderately rapid permeability in subsoil; rapid permeability in substratum.	Medium shear strength; fair to good compaction characteristics; piping hazard.	Natural drainage is adequate.	Moderate available water capacity; moderate intake rate; well drained; moderately deep soil.	Slopes of 0 to 3 percent; sand at a depth of 20 to 40 inches.
Fair in subsoil: susceptible to frost action. Good in substratum: seasonal high water table.	Fair: sand in substratum; some fines; seasonal high water table.	Fair in surface layer: thin. Poor in subsoil: seasonal high water table; thin over sand.	Moderate permeability in subsoil; rapid permeability in substratum; seasonal high water table.	Medium shear strength in subsoil and substratum; fair compaction characteristics in subsoil; good compaction characteristics in substratum; piping hazard.	Seasonal high water table; moderate permeability in subsoil; rapid permeability in substratum; unstable when wet.	Moderate available water capacity; moderate intake rate; somewhat poorly drained; moderately deep soil.	Slopes of 0 to 2 percent; somewhat poorly drained; sand at a depth of 20 to 40 inches.
Good: some-	Fair: mod-	Good in sur-	Moderately	Medium shear	Natural drain-	Low available	Slopes of 0 to 3

TABLE 10.—*Engineering interpretations for*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements	Sanitary landfill (trench type)	Local roads and streets
Elkmound: EmB, EmC2	Severe: shallow to sandstone bedrock.	Severe: shallow to sandstone bedrock; slope.	Severe: shallow to sandstone bedrock.	Severe: difficult to rip sandstone with light equipment.	Severe: shallow to sandstone bedrock.	Severe: depth to sandstone bedrock.
EmD2, EmE	Severe: slope; moderately deep to sandstone bedrock.	Severe: slope.	Severe: slope; shallow to sandstone bedrock.	Severe: slope.	Severe: shallow to sandstone bedrock.	Severe: depth to sandstone bedrock; slope.
Elm Lake: Eo	Severe: high water table.	Severe: high water table.	Severe: high water table;	Severe: high water table.	Severe: high water table;	Severe: high water table.

town and country planning—Continued

Suitability as source of—			Soil features affecting—				
Roadfill	Sand	Topsoil	Pond reservoir areas	Dikes, levees and other embankments	Drainage for crops and pasture	Irrigation	Terraces and diversions
Poor: shallow to platy	Fair to poor: shallow to	Poor: thin; shallow to	Moderate permeability in	Medium shear strength;	Natural drainage is ade-	Low available water capac-	Slopes of 2 to 12 percent;

TABLE 10.—*Engineering interpretations for*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements	Sanitary landfill (trench type)	Local roads and streets
Fallcreek: FoA, FoB	Severe: seasonal high water table; moderately slow permeability.	Severe: moderately slow permeability in subsoil and substratum;	Severe: seasonal high water table.	Severe: seasonal high water table.	Moderate: seasonal high water table; difficult to work; stones	Severe: susceptible to frost action; seasonal high water table.

town and country planning—Continued

[redacted]	[redacted]

TABLE 10.—*Engineering interpretations for*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements	Sanitary landfill (trench type)	Local roads and streets
Gotham—Continued						
GoC2	Moderate: slope [2]	Severe: slope; rapid permeability.	Severe: low sidewall stability.	Moderate: slope.	Severe: rapid permeability.	Moderate: slope.
GsB	Slight or moderate: [1] moderately	Severe: rapid permeability.	Severe: low sidewall stability;	Slight or moderate: sandstone	Severe: rapid permeability;	Slight

town and country planning—Continued

Suitability as source of—			Soil features affecting—				
Roadfill	Sand	Topsoil	Pond reservoir areas	Dikes, levees and other embankments	Drainage for crops and pasture	Irrigation	Terraces and diversions
Good	Good: some fines in substratum in places.	Poor: sandy	Rapid permeability.	Medium shear strength; fair to good compaction characteristics; piping hazard.	Natural drainage is somewhat excessive.	Low available water capacity; rapid intake rate; somewhat excessively drained; deep soil; sloping; hazard of soil blowing.	Slopes of 6 to 12 percent; sandy; difficult to vegetate.
Fair: underlain by sandstone bedrock.	Fair: loamy strata in places; sandstone bedrock.	Poor: sandy	Rapid permeability; sandstone bedrock at a depth of 40 to 60 inches.	Medium shear strength; fair to good compaction characteristics; piping hazard; sandstone bedrock at a depth of 40 to 60 inches.	Natural drainage is somewhat excessive.	Low available water capacity; rapid intake rate; somewhat excessively drained; deep soil; hazard of soil blowing.	Slopes of 2 to 6 percent; sandstone bedrock at a depth of 40 to 60 inches; sandy; difficult to vegetate.
Fair: underlain by sandstone bedrock.	Fair: loamy strata in places; sandstone bedrock.	Poor: sandy	Rapid permeability; sandstone bedrock at a depth of 40 to 60 inches.	Medium shear strength; fair to good compaction characteristics; piping hazard; sandstone bedrock at a depth of 40 to 60 inches.	Natural drainage is somewhat excessive.	Low available water capacity; rapid intake rate; somewhat excessively drained; deep soil; sloping; hazard of soil blowing.	Slopes of 6 to 12 percent; sandstone bedrock at a depth of 40 to 60 inches; sandy; difficult to vegetate.
Fair to poor: moderate shrink-swell potential; susceptible to frost action; moderately deep to sandstone and shale.	Unsuited	Good in surface layer. Poor in subsoil: clayey; thin over shale and sandstone.	Slow permeability in lower part of subsoil; seasonal high water table at a depth of 3 to 5 feet; sandstone and shale at a depth of 20 to 40 inches.	Medium to low shear strength; fair to good compaction characteristics; piping hazard; sandstone and shale bedrock at a depth of 20 to 40 inches.	Natural drainage is adequate; seasonal high water table for short periods.	Moderate available water capacity; moderate intake rate; well drained and moderately well drained; moderately deep soil.	Slopes of 6 to 12 percent; well drained and moderately well drained; sandstone and shale bedrock at a depth of 20 to 40 inches.
Fair to poor: moderate shrink-swell potential; susceptible to frost action; moderately deep to sandstone	Unsuited	Fair in surface layer. Poor in subsoil: high clay content; thin over sandstone and shale	Moderate to slow permeability; seasonal high water table; sandstone and shale at a depth of 20	Medium to low shear strength; fair to good compaction characteristics; piping hazard; sandstone	Natural drainage is adequate in some areas, other areas have high seasonal water table; sandstone	Moderate available water capacity; moderate intake rate; well drained to somewhat poorly	Slopes of 2 to 6 percent; well drained to somewhat poorly drained; sandstone and shale bedrock at

TABLE 10.—*Engineering interpretations for*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements	Sanitary landfill (trench type)	Local roads and streets
Hixton: HnB, HnC2	Moderate: [1] moderately deep to sandstone bedrock; slope.[2]	Severe: rapid permeability in substratum; moderately deep to sandstone bedrock.	Moderate: [3] moderately deep to sandstone bedrock.	Moderate: rippable sandstone in most places.	Severe: moderately deep to sandstone bedrock; rapid permeability in substratum.	Moderate: depth to sandstone bedrock.
HnD2	Severe: slope.	Severe: rapid permeability in substratum; moderately deep to sandstone bedrock; slope.	Severe: slope; moderately deep to sandstone bedrock.	Severe: slope; sandstone bedrock.	Severe: moderately deep to sandstone bedrock; rapid permeability in substratum.	Severe: slope.
Houghton: Ho	Severe: high water table.	Severe: high water table; organic material.	Severe: high water table; organic material unstable.	Severe: organic material unsuited for dwelling site; high water table.	Severe: organic material; high water table.	Severe: organic material; high water table.
Humbird Mapped only with Ludington soils.	Severe: seasonal high water table; moderately slow permeability.	Moderate if slopes are 0 to 6 percent; severe if slopes are more than 6 percent.	Moderate: [3] moderately deep to sandstone and shale bedrock; seasonal high water table at a depth of 3 to 5 feet.	Moderate: seasonal high water table; danger of basement seepage; rippable sandstone and rippable shale bedrock in most places.	Moderate: seasonal high water table; rippable sandstone and rippable shale in most places; danger of lateral seepage in places.	Moderate: moderate stability in subsoil; moderately deep to sandstone and shale.
Kert: KA	Severe: seasonal high water table; moderately slow permeability in substratum.	Moderate: sandstone in substratum allows lateral seepage in places.	Severe: seasonal high water table; moderately deep to sandstone and shale bedrock.	Severe: seasonal high water table.	Severe: seasonal high water table; sandstone and shale bedrock.	Moderate: depth to sandstone and shale bedrock; seasonal high water table.

See footnotes at end of table.

town and country planning—Continued

Suitability as source of—			Soil features affecting—				
Roadfill	Sand	Topsoil	Pond reservoir areas	Dikes, levees and other embankments	Drainage for crops and pasture	Irrigation	Terraces and diversions
Fair: mod	Poor: [redacted]	Fair in [redacted]	Moderate [redacted]	Medium to [redacted]	Natural [redacted]	Moderate [redacted]	Slopes of 2 to [redacted]

TABLE 10.—*Engineering interpretations for*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements	Sanitary landfill (trench type)	Local roads and streets
Lows: La	Severe: high water table.	Severe: high water table; rapid permeability in substratum.	Severe: high water table.	Severe: high water table; in places surface water is a concern for short periods.	Severe: high water table.	Severe: high water table.
*Ludington: LuB, LuC. For Humbird part, see Humbird series.	Severe: seasonal high water table; moderately deep to shale and sandstone bedrock.	Severe: rapid permeability in upper part of subsoil; sandstone in substratum can allow lateral seepage.	Moderate: [3] moderately deep to sandstone and shale bedrock; seasonal high water table at a depth of 3 to 5 feet.	Moderate: seasonal high water table; danger of basement seepage; rippable sandstone and rippable shale bedrock in most places.	Severe: sandy; danger of lateral seepage; sandstone and shale bedrock; seasonal high water table.	Slight if slopes are 2 to 6 percent; moderate if slopes are 6 to 12 percent; moderately deep to sandstone and shale bedrock; seeps and springs in places.
Markey: Ma	Severe: high water table.	Severe: high water table.	Severe: high water table; organic material and underlying sand unstable.	Severe: organic material unsuited for dwelling site; high water table.	Severe: organic material; high water table.	Severe: organic material; high water table.
Marshan: Mc	Severe: high water table.	Severe: high water table; rapid permeability in substratum.	Severe: high water table.	Severe: high water table; in places surface water is a concern for short periods.	Severe: high water table.	Severe: high water table.

See footnotes at end of table.

town and country planning—Continued

Suitability as source of—			Soil features affecting—				
Roadfill	Sand	Topsoil	Pond reservoir areas	Dikes, levees and other embankments	Drainage for crops and pasture	Irrigation	Terraces and diversions
Poor: high water table.	Fair: fines in substratum; high water table.	Fair in surface layer: thin. Poor in subsoil: thin over sand.	Moderate permeability in subsoil; rapid permeability in substratum; high water table.	Medium to low shear strength; fair to good compaction characteristics in subsoil; medium shear strength; good compaction characteristics in substratum; piping hazard.	High water table; moderate permeability in subsoil; rapid permeability in substratum; temporary ponding; unstable when wet.	Moderate available water capacity; moderate intake rate; poorly drained; moderately deep soil; temporary ponding.	Slopes of 0 to 2 percent; poorly drained; sand at a depth of 20 to 40 inches; temporary ponding.
Fair: moderately deep to sandstone and shale.	Unsuited	Poor: sandy; thin over sandstone and shale.	Rapid permeability in upper part of subsoil, moderately slow permeability in lower part; sandstone and shale at a depth of 20 to 40 inches.	Medium shear strength; fair to good compaction characteristics; piping hazard; sandstone and shale bedrock at a depth of 20 to 40 inches.	Natural drainage is adequate.	Low available water capacity; rapid intake rate; well drained to moderately well drained; moderately deep soil.	Slopes of 2 to 12 percent; well drained to moderately well drained; sandstone and shale bedrock at a depth of 20 to 40 inches; difficult to vegetate in places.
Poor: organic material; high water table.	Poor: variable underlying sand; organic material and high water table hinders excavation.	Poor: organic material; high water table.	Rapid permeability in organic material; rapid permeability in underlying sand; high water table.	Unsuitable organic matter; medium shear strength in sand substratum; good compaction characteristics; piping hazard.	Seasonal high water table; rapid permeability in organic matter; rapid permeability in underlying sand; unstable when wet.	High available water capacity; rapid intake rate; moderately thick organic material over sand; very poorly drained; hazard of soil blowing.	Generally not applicable; slopes of 0 to 2 percent; very poorly drained; organic material.
Poor: high water table.	Fair: thin strata of poorly	Poor: high water table.	Moderate permeability in subsoil;	Medium to low shear strength;	High water table; moderate per-	Moderate available water capac-	Slopes of 0 to 2 percent; poorly

TABLE 10.—*Engineering interpretations for*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements	Sanitary landfill (trench type)	Local roads and streets
Menahga:						
MdB	Slight [2]	Severe: rapid permeability in substratum.	Severe: low sidewall stability.	Slight	Severe: rapid permeability.	Slight
MdC	Moderate: [2] slope.	Severe: slope.	Severe: low sidewall stability.	Moderate: slope.	Severe: rapid permeability.	Moderate: slope.
Meridian:						
MeA, MB	Slight [2]	Severe: rapid permeability in substratum.	Moderate: moderate sidewall stability.	Slight	Severe: rapid permeability in substratum.	Moderate in subsoil; slight in substratum.
MC2	Moderate: [2] slope.	Severe: slope.	Moderate: moderate sidewall stability; slope.	Moderate: slope.	Severe: rapid permeability in substratum.	Moderate: slope.
MmA	Severe: seasonal high water table.	Severe: rapid permeability in substratum.	Moderate: moderate sidewall stability; seasonal high water table at a depth of 3 to 5 feet.	Moderate: seasonal high water table; danger of basement seepage.	Severe: rapid permeability in substratum; seasonal high water table hinders excavation.	Moderate in subsoil; slight in substratum; in places seasonal high water table is a concern in the lower part of subsoil and substratum.

See footnotes at end of table.

town and country planning—Continued

Suitability as source of—			Soil features affecting—				
Roadfill	Sand	Topsoil	Pond reservoir areas	Dikes, levees and other embankments	Drainage for crops and pasture	Irrigation	Terraces and diversions
Good	Good	Poor: sandy	Rapid permeability.	Medium shear strength; good compaction characteristics; piping hazard.	Natural drainage is excessive.	Very low available water capacity; rapid intake rate; excessively drained; deep soil; hazard of soil blowing.	Slopes of 1 to 6 percent; sandy; difficult to vegetate.
Good	Good	Poor: sandy	Rapid permeability.	Medium shear strength; good compaction characteristics; piping hazard.	Natural drainage is excessive.	Very low available water capacity; rapid intake rate; excessively drained; deep soil; hazard of soil blowing.	Slopes of 6 to 12 percent; sandy; difficult to vegetate.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE 10.—*Engineering interpretations for*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements	Sanitary landfill (trench type)	Local roads and streets
Merrillan Mapped only with Fairchild soils.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table; moderately deep to sandstone and shale bedrock.	Severe: seasonal high water table.	Severe: seasonal high water table; sandstone and shale bedrock.	Moderate: seasonal high water table; depth to sandstone and shale bedrock.

town and country planning—Continued

Suitability as source of—			Soil features affecting—				
Roadfill	Sand	Topsoil	Pond reservoir areas	Dikes, levees and other embankments	Drainage for crops and pasture	Irrigation	Terraces and diversions
Fair to poor: moderate shrink-swell potential;	Unsuited	Fair in surface layer: thin. Poor in subsoil: thin	Moderate permeability in upper part of subsoil, slow	Medium to low shear strength; fair com-	Seasonal high water table; moderate permeability	Low available water capacity; moderate intake	Slopes of 0 to 6 percent; somewhat poorly

TABLE 10.—*Engineering interpretations for*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements	Sanitary landfill (trench type)	Local roads and streets
Norden: NrC2	Moderate: [1] slope.[2]	Severe: slope.	Moderate: [3] moderately deep to sandstone bedrock.	Moderate: rippable sandstone in most places.	Moderate: moderately deep to rippable sandstone in most places; danger of seepage in places.	Severe: moderately deep to sandstone bedrock.
NrD2, NrE2	Severe: slope.	Severe: slope.	Severe: slope; moderately deep to sandstone bedrock.	Severe: slope; moderately deep to sandstone bedrock.	Moderate to severe: moderately deep to rippable sandstone in most places; danger of seepage in places.	Severe: slope.
Northfield: NtB, NtC2	Severe: shallow to sandstone bedrock.	Severe: shallow to sandstone bedrock.	Severe: shallow to bedrock.	Severe: difficult to rip sandstone with light equipment.	Severe: shallow to sandstone bedrock.	Severe: shallow to platy sandstone bedrock.
NtD2, NtE2, NtF	Severe: shallow to sandstone bedrock; slope.	Severe: slope; shallow to sandstone bedrock.	Severe: shallow to bedrock; slope.	Severe: slope; sandstone bedrock.	Severe: shallow to sandstone bedrock; slope.	Severe: slope; depth to sandstone bedrock.
Orion: On	Severe: seasonal high water table; subject to flooding.	Severe: seasonal high water table; subject to flooding.	Severe: seasonal high water table; subject to flooding.	Severe: seasonal high water table; subject to flooding.	Severe: seasonal high water table; subject to flooding.	Severe: seasonal high water table; subject to flooding.

See footnotes at end of table.

town and country planning—Continued

Suitability as source of—			Soil features affecting—				
Roadfill	Sand	Topsoil	Pond reservoir areas	Dikes, levees and other embankments	Drainage for crops and pasture	Irrigation	Terraces and diversions
Fair: moderately deep to sand-	Poor: mostly silt loam over sand-	Fair in surface layer: thin. Poor in sub-	Moderate permeability in subsoil;	Medium to low shear strength;	Natural drainage is adequate.	Moderate available water capac-	Slopes of 6 to 12 percent; sandstone bedrock at

TABLE 10.—*Engineering interpretations for*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements	Sanitary landfill (trench type)	Local roads and streets
Otter: Or	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.	Severe: high water table; subject to flooding.
Otterholt: OsB	Moderate: moderate permeability.	Moderate: moderate permeability.	Slight	Slight	Slight	Severe: susceptible to frost action.
OsC2	Moderate:	Severe:	Moderate:	Moderate:	Slight	Moderate:

town and country planning—Continued

Suitability as source of—			Soil features affecting—				
Roadfill	Sand	Topsoil	Pond reservoir areas	Dikes, levees and other embankments	Drainage for crops and pasture	Irrigation	Terraces and diversions
Poor: high water table;	Unsuited	Poor: high water table;	Moderate permeability;	Low to medium shear	High water table; mod-	Very high available	Slopes of 0 to 2 percent;

TABLE 10.—*Engineering interpretations for*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption	Sewage lagoons	Shallow excavations	Dwellings with	Sanitary landfill	Local roads and streets

town and country planning—Continued

Suitability as source of—			Soil features affecting—				
Roadfill	Sand	Topsoil	Pond reservoir areas	Dikes, levees and other embankments	Drainage for crops and pasture	Irrigation	Terraces and diversions
Good: weakly cemented sandstone.	Good: weakly cemented sandstone.	Poor: sandy.	Rapid permeability; sandstone bedrock at a depth of 20 to 40 inches.	Medium shear strength; fair to good compaction characteristics; piping hazard; sandstone bedrock at a depth of 20 to 40 inches.	Natural drainage is excessive.	Very low available water capacity; rapid intake rate; excessively drained; moderately deep soil; hazard of soil blowing.	Slopes of 2 to 12 percent; sandstone bedrock at a depth of 20 to 40 inches; sandy; difficult to vegetate.
Good	Good	Poor: sandy.	Rapid permeability.	Medium shear strength; good compaction characteristics; piping hazard.	Natural drainage is excessive.	Low available water capacity; rapid intake rate; excessively drained; deep soil; hazard of soil blowing.	Slopes of 1 to 6 percent; sandy; difficult to vegetate.
Good	Good	Poor: sandy.	Rapid permeability.	Medium shear strength; good compaction characteristics; piping hazard.	Natural drainage is excessive.	Low available water capacity; rapid intake rate; excessively drained; deep soil; slope; hazard of soil blowing.	Slopes of 6 to 12 percent; sandy; difficult to vegetate.
Good	Fair; loamy.	Poor: sandy.	Rapid permeability; loamy bands in substratum.	Medium shear strength; good compaction characteristics; piping hazard.	Natural drainage is excessive.	Low available water capacity; rapid intake rate; excessively drained; deep soil with loamy bands in substratum; hazard of blowing.	Slopes of 1 to 12 percent; sandy; difficult to vegetate.
Fair: variable sand and gravel content; subject to flooding.	Fair: variable sand and gravel content; often inaccessible.	Poor: sandy; subject to flooding.	Rapid permeability; subject to flooding.	Medium shear strength; good compaction characteristics; piping hazard.	Natural drainage is excessive; subject to flooding.	Very low available water capacity; rapid intake rate; excessively drained; subject to flooding; hazard of soil blowing.	Generally not applicable; slopes of 0 to 2 percent; subject to frequent flooding; sandy; difficult to vegetate.

TABLE 10.—*Engineering interpretations for*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements	Sanitary landfill (trench type)	Local roads and streets
Seaton: SeB, SeC2	Moderate: moderate permeability.	Moderate if slopes are 2 to 6 percent; severe if slopes are 6 to 12 percent; moderate permeability.	Slight if slopes are 2 to 6 percent; moderate if slopes are steeper than 6 percent.	Moderate: moderate stability and shear strength; danger of basement seepage for short periods.	Slight	Moderate: susceptible to frost action.
SeD2, SeE2	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.

town and country planning—Continued

[redacted]

TABLE 10.—*Engineering interpretations for*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements	Sanitary landfill (trench type)	Local roads and streets
Sexton—Continued						

town and country planning—Continued

Suitability as source of—			Soil features affecting—				
Roadfill	Sand	Topsoil	Pond reservoir areas	Dikes, levees and other embankments	Drainage for crops and pasture	Irrigation	Terraces and diversions
Fair: susceptible to frost action	Unsuited	Fair in surface layer: thin. Fair in sub-	Moderate permeability in subsoil and	Medium shear strength; fair com-	Natural drainage is adequate in	Very high available water capac-	Slopes of 0 to 6 percent; moderately

TABLE 10.—*Engineering interpretations for*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements	Sanitary landfill (trench type)	Local roads and streets
Terrace escarpments, sandy: To	Severe: slope	Severe: slope:	Severe: low	Severe: slope	Severe: rapid	Slight

town and country planning—Continued

Suitability as source of—			Soil features affecting—				
Roadfill	Sand	Topsoil	Pond reservoir areas	Dikes, levees and other embankments	Drainage for crops and pasture	Irrigation	Terraces and diversions
Good	Good	Poor: sandy; slope.	Rapid permeability; steep.	Medium shear strength; good to fair compaction characteristics; piping hazard.	Natural drainage is excessive.	Low available water capacity; rapid intake rate; excessively drained; steep.	Slopes of 12 to 45 percent; sandy; difficult to vegetate.
Good	Good	Poor: sandy	Rapid permeability.	Medium shear strength; good compaction characteristics; piping hazard.	Natural drainage is excessive.	Low available water capacity; rapid intake rate; excessively drained; deep soil; hazard of soil blowing.	Slopes of 1 to 6 percent; sandy; difficult to vegetate.
Fair to poor: moderately deep to weakly cemented sandstone; susceptible to frost action; slope.	Poor: sandstone; high in fines.	Poor: thin; slope.	Moderate permeability in subsoil; sandstone bedrock at a depth of 20 to 40 inches; steep.	Medium to low shear strength; fair to poor compaction characteristics; piping hazard; sandstone bedrock at a depth of 20 to 40 inches.	Natural drainage is adequate.	Moderate available water capacity; moderate intake rate; somewhat excessively drained; moderately deep soil; moderately steep to steep.	Slopes of 12 to 45 percent; sandstone bedrock at a depth of 20 to 40 inches.
Poor: high water table.	Unsuited	Poor: high water table.	Moderately slow permeability; high water table.	Medium to low shear strength; fair to poor compaction characteristics; piping	High water table; moderately slow permeability; temporary ponding; sand-	Moderate available water capacity; slow intake rate; very poorly drained;	Slopes of 0 to 2 percent; very poorly drained; sandstone and shale bedrock at

TABLE 10.—*Engineering interpretations for*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements	Sanitary landfill (trench type)	Local roads and streets
Vilas: VlB	Slight [2]	Severe: very rapid permeability.	Severe: low sidewall stability.	Slight	Severe: very rapid permeability.	Slight
Whitehall: Wh	Moderate: moderate permeability.	Moderate: moderate permeability.	Slight	Slight	Slight	Moderate: susceptible to frost action.

[1] Where bedrock is unweathered, hard, or impermeable, the rating is severe.
[2] Poor filtering material; hazard of contaminating nearby water supplies.
[illegible] usually excavated to a depth of 40 to 60 inches

bedrock or other unfavorable material; presence of [illegible] and resistance to water erosion.

Tests to determine liquid limit and plastic limit measure the effect of water on the consistence of soil

town and country planning—Continued

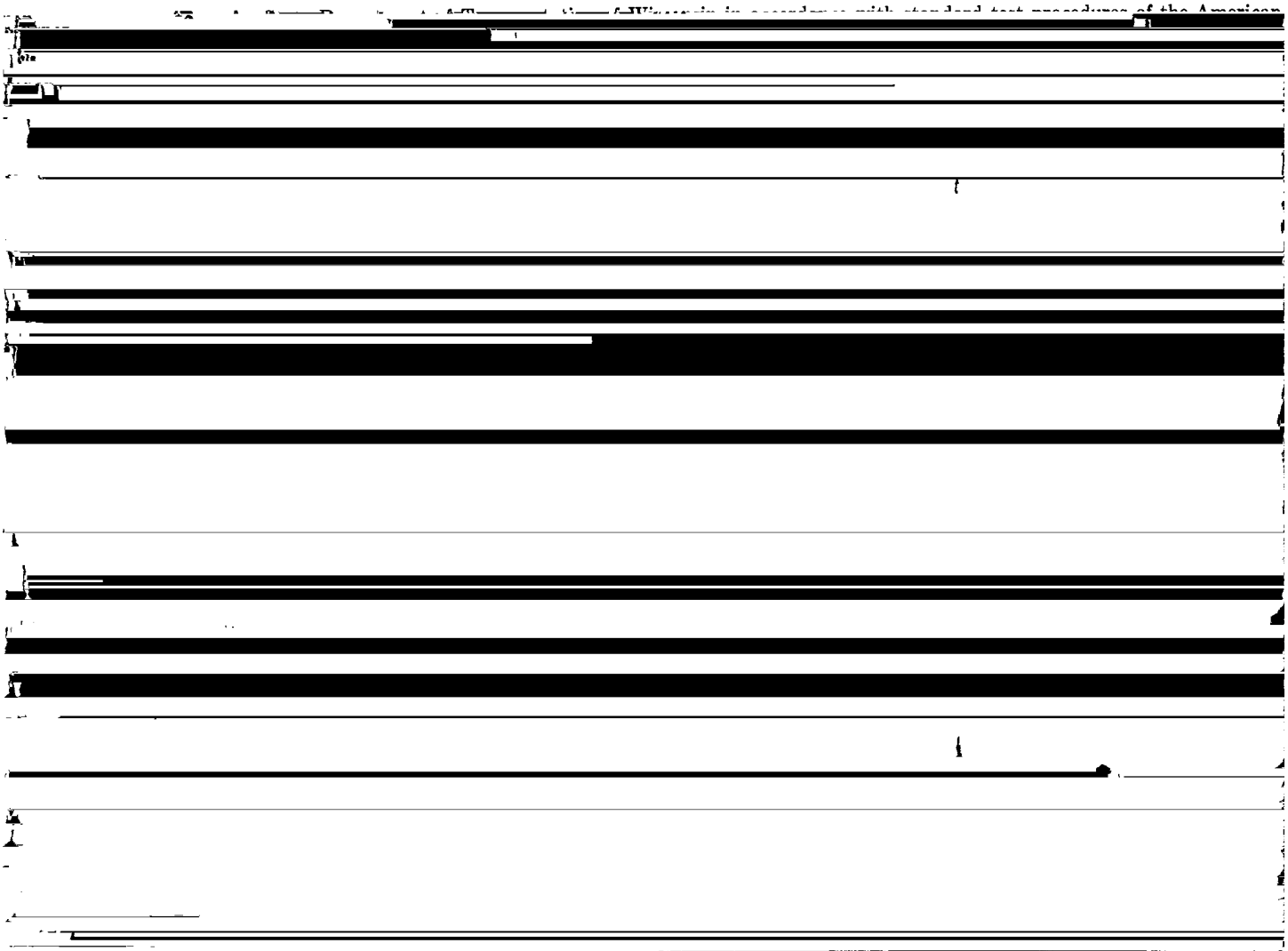
Suitability as source of—			Soil features affecting—				
Roadfill	Sand	Topsoil	Pond reservoir areas	Dikes, levees and other embankments	Drainage for crops and pasture	Irrigation	Terraces and diversions
Good	Good	Poor: sandy	Very rapid permeability.	Medium shear strength; good compaction characteristics; piping hazard.	Natural drainage is excessive.	Very low available water capacity; rapid intake rate; excessively drained; deep soil; hazard of soil blowing.	Slopes of 1 to 6 percent; sandy; difficult to vegetate.
Fair: susceptible to frost action.	Unsuited	Good in surface layer. Fair in subsoil: friable in upper part, firm below.	Moderate permeability; rapid permeability in lower part of substratum.	Medium to low shear strength, fair to poor compaction characteristics in subsoil; medium shear strength and fair to good compaction characteristics in substratum; piping hazard.	Natural drainage is adequate.	High available water capacity; moderate intake rate; well drained; deep soil.	Slopes of 0 to 2 percent.

[4] Source of gravel.
[5] Sandy or gravelly materials can be easily excavated, but have a severe hazard of sloughing.

are determined by the physical and mineralogical composition of the parent material; the climate under which the soil material has accumulated and existed

Common belief is that a combination of basic or simple processes takes place in all soils and is responsible for horizon differentiation. All of these processes

TABLE 11.—*Engineering*



Soil name and location	Parent material	Depth from surface	Moisture density [1]	
			Maximum dry density	Optimum moisture
		Inches	*Pounds per cubic foot*	*Percent*
Arenzville silt loam:				
200 feet north and 100 feet west of the SE corner of SE¼ sec. 11, T. 26 N., R. 8 W. (Modal)	Silty alluvium.	8–28	----------	----------
		28–39	----------	----------
		39–60	112.1	15.8
Curran silt loam:				
1,200 feet west and 1,250 feet north of the SE corner of SW¼ sec. 9, T. 26 N., R. 7 W. (Modal)	Eolian and silty sediment.	22–34	----------	----------
		44–60	----------	----------
Seaton silt loam:				
500 feet south and 300 feet east of the NW corner of sec. 10, T. 26 N., R. 8 W. (Modal)	Eolian silt.	12–34	----------	----------
		38–60	----------	----------
Shiffer loam:				
700 feet north and 300 feet west of the SE corner of NE¼ sec. 6, T. 27 N., R. 10 W. (Modal)	Loamy and sandy outwash.	14–26	----------	----------
		30–60	----------	----------

test data

Association of State Highway (and Transportation) Officials (AASHTO) (1). Dashes indicate that no determination was made.

Mechanical analysis [2]						Liquid limit [3]	Plasticity index [4]	Classification	
Percentage less than 3 inches passing sieve—			Percentage smaller than—					AASHTO [5]	Unified [6]
No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)	0.05 mm	0.005 mm	0.002 mm				
						Percent			
100	100	99	96	22	14	31	5	A-4(8)	ML
100	99	95	90	19	13	44	9	A-5(9)	ML
100	100	97	92	24	21	30	8	A-4(8)	CL
100	99	92	84	21	18	29	6	A-4(8)	ML
100	96	76	69	18	14	----------	[7] NP	A-4(8)	ML
100	100	93	85	24	21	33	10	A-4(8)	CL
100	100	96	90	22	18	32	8	A-4(8)	ML
100	89	56	51	23	20	27	11	A-6(4)	CL
100	91	20	15	5	4	----------	NP	A-2-4(0)	SM

Shiffer, Sparta, Trempe, and Vilas soils formed on stream terraces and outwash plains in 10 to 40 inches

In Eau Claire County vegetation is a major factor in determining differences among soils. For example, soils that have a thick, dark colored surface layer,

evaporates on the south and west slopes, and less moisture is available for weathering of soil material. The trend of vegetation on the warmer and drier slopes is toward grass, and the trend on north and east slopes is toward trees. Although this trend is not of major significance in influencing the pattern of soils in Eau Claire County, its influence is apparent in

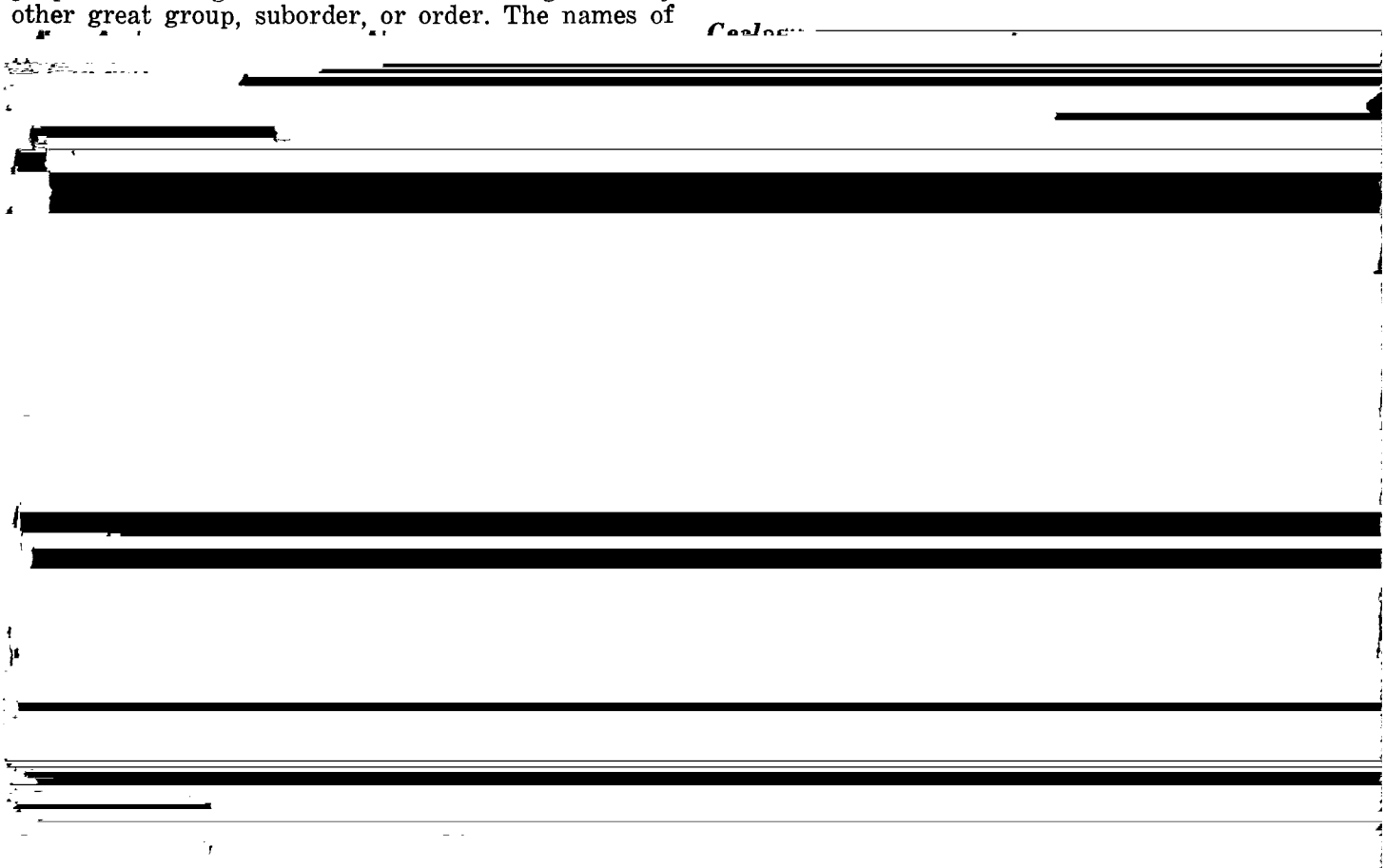
through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

The narrow categories of classification, such as those used in detailed soil surveys, allow us to organize and apply knowledge about soils in managing farms, fields, and woodlands; in developing rural

TABLE 12.—*Classification of the soils*

Series	Family	Subgroup	Order
Adrian	Sandy or sandy-skeletal, mixed, euic, mesic	Terric Medisaprists	Histosols.
Alluvial land, sandy [1]		Udipsamments	Entisols.
Alluvial land, wet [1]		Fluvaquents	Entisols.
Arenzville	Coarse-silty, mixed, nonacid, mesic	Typic Udifluvents	Entisols.
Arland	Fine-loamy over sandy or sandy-skeletal, mixed	Eutric Glossoboralfs	Alfisols.
Au Gres	Sandy, mixed, frigid	Entic Haplaquods	Spodosols.
Billett	Coarse-loamy, mixed, mesic	Mollic Hapludalfs	Alfisols.
Boone	Mesic, uncoated	Typic Quartzipsamments	Entisols.
Burkhardt	Sandy, mixed, mesic	Typic Hapludolls	Mollisols.
Cable [2]	Coarse-loamy, mixed, nonacid, frigid	Typic Haplaquepts	Inceptisols.
Caryville	Sandy, mixed	Fluventic Haploborolls	Mollisols.
Chetek	Coarse-loamy, mixed	Eutric Glossoboralfs	Alfisols.
Curran	Fine-silty, mixed, mesic	Udollic Ochraqualfs	Alfisols.

Subgroup.—Great groups are subdivided into subgroups, one representing the central (typic) segment of the group, and others called intergrades that have properties of the group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside of the range of any other great group, suborder, or order. The names of



tives before the name of the great group. An example is Typic Hapludalfs (typical Hapludalfs).

Family.—Soil families are separated within a subgroup primarily on the basis of properties important to the growth of plants or on the behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. A family name consists of a series of adjectives preceding the subgroup name. The adjectives are the class names for texture, mineralogy, and so on, that are used as family differentiae [table 12]. An example is the coarse-loamy, mixed, mesic family of Mollic Hapludalfs.

Environmental Factors Affecting Soil Use

county at the eastern border and flows west to the city of Eau Claire where it connects with the Chippewa River. Tributaries of these rivers extend far into the uplands of the county. Four artificial lakes were formed by damming the Eau Claire and Chippewa Rivers. Also, a natural lake is in the city of Eau Claire.

The geology of Eau Claire County consists of thin loamy glacial deposits, variable depths of sandy and loamy stream sediment, and thin to deep windborne deposits over Cambrian sandstone. The southwestern corner of the county is within the boundary of the driftless area. In a few places the creeks and rivers have cut through the sandstone to the underlying crystalline rock.

Climate [6]

The climate of Eau Claire County is typically continental with warm summers and cold winters. The area is in the zone of frequent midlatitude storms. Spring and fall are commonly short and are generally periods of sharp temperature transitions.

The data in tables 13 and 14 are based on records (1930–59) at the city of Eau Claire and are fairly representative of the county as a whole. The minimum temperatures throughout the county sometimes vary

TABLE 13.—*Temperature and precipitation data*

[All data from Eau Claire. Based on records for the period 1930–59]

Month	Temperature							Precipitation		
	Average	Average	Average	Maximum number of	Maximum number of	Minimum number of	Minimum number of	Average heating-degree-	Average	Average snow	Days with 0.1

age date of the last 32 degree freeze in spring is May 5, and the first in fall is October 4. The growing season, defined as the number of days between the last 32 degree freeze in spring and the first in fall, averages 151 days. The term "growing season" can be misleading, however, because different crops have different temperatures at which growth is affected. Also, the minimum temperatures vary considerably across Eau Claire County on calm, clear nights, depending on

(2) American Society for Testing and Materials. 1974. Methods for classification of soils for engineering purposes. ASTM Stand. D 2487–69. *In* 1974 Annual Book of ASTM Standards, Part 19, 464 pp., illus.
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(4) Beatty, M. T., E. A. Brickbauer, A. J. Klingelhoets, and D. A. Rohwede. 1966. Wheat yields from Wisconsin soils. Univ. Wis. Ex. Serv. Spec. Circ. 65, 19 p.
(5) Bender, William H. 1962. Soils suitable for septic tank [illegible] 12 pp., illus.
(6) Cooley, J. H. 1962. Site requirements and yield of paper birch in northern Wisconsin, U.S. Dep. Agric., Forest Serv. Lakes States Forest Ex. Stn. Pap. 105.
(7) Curtis, John T. 1971. The vegetation of Wisconsin. Univ. Wisc. Press, Madison.
(8) Curtis, R. O. and B. W. Post. 1962. Site index curves for even-aged northern hardwoods in the Green Mountains of Vermont. Vt. Agric. Exp. Stn. Bull. 629.
(9) Eyre, F. H. and Russel K. LeBarron. 1944. Management of jack pine stands in the Lake States. U.S. Dept. Agric. Tech. Bull. 863.
(10) ———— and Paul Zehngraff. 1948. Red pine management in Minnesota. U.S. Dep. Agric. Circ. 778.
(11) Foster, R. W. 1959. Relation between site indexes of eastern white pine and red maple. Forest Sci. 5 (3) 279–291.
(12) Gevorkiantz, S. R. 1956. Site index curves for jack pine in the Lake States. U.S. Dep. Agric. Forest Serv. Lake illus. [Supplements issued March 1967, September 1968, April 1969.]
(30) ———— 1961. Land capability classification. U.S. Dep. Agric. Handb. 210, 21 pp.
(31) Wisconsin Department of Natural Resources. 1968. Wisconsin Forest Resource Statistics, West Central Survey Report.

Glossary

[redacted]

Acidity. See "Reaction, soil."

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	More than 9

Blowout. A shallow depression from which all or most of the soil material has been removed by wind. A blowout has a flat or irregular floor formed by a resistant layer or by an

[redacted]

[redacted]

ther acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH		pH
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Substratum. The part of the soil below the solum.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use or management.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drain-

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and the description of the soil series to which the mapping unit belongs. In referring to a capability unit, a woodland suitability group or any other group, read the introduction to the section it is in for general information about its management.

Map symbol	Mapping unit	Page	Capability unit		Woodland suitability group	Wildlife group	Recreation group	Tree and shrub group
			Symbol	Page	Number	Number	Number	Number
Ad	Adrian muck	9	IVw-7	66	3w3	8	8	4
Ae	Alluvial land, sandy	11	VIIs-9	68	3s1	3	7	2
Af	Alluvial land, wet	11	Vw-14	67	4w2	7	7	3
ArA	Arenzville silt loam, 0 to 3 percent slopes	11	IIw-11	62	2o1	9	7	1
AtB	Arland sandy loam, 2 to 6 percent slopes	12	IIIs-4	64	2o1	1	2	2
AtC2	Arland sandy loam, 6 to 12 percent slopes, eroded	12	IIIe-7	63	2o1	1	2	2
AtD2	Arland sandy loam, 12 to 20 percent slopes, eroded	12	IVe-7	66	2r1	1	2	2
Au	Au Gres loamy sand	13	IVw-5	66	3s2	6	5	3
BlB	Billett sandy loam, 1 to 6 percent slopes	14	IIIs-4	64	3o1	1	2	2
BlC2	Billett sandy loam, 6 to 12 percent slopes, eroded	14	IIIe-7	63	3o1	1	2	2
BlD2	Billett sandy loam, 12 to 20 percent slopes, eroded	14	IVe-7	66	3r1	1	2	2
BmA	Billett sandy loam, moderately well drained, 0 to 3 percent slopes	14	IIIs-4	64	3o1	1	2	2
BoB	Boone-Plainbo complex, 2 to 6 percent slopes	15	VIIs-9	68	3s1	3	4	2
BoC	Boone-Plainbo complex, 6 to 12 percent slopes	15	VIIs-9	68	3s1	3	4	2
BoE	Boone-Plainbo complex, 12 to 45 percent slopes	16	VIIs-9	68	3s3	3	4	2
BuA	Burkhardt sandy loam, 0 to 3 percent slopes	16	IIIe-3	63	3d1	4	3	2
Cb	Cable loam	17	IIIw-3	64	3w2	7	6	3
CeA	Caryville loam, 0 to 3 percent slopes	17	IIIw-12	64	3o1	9	3	2
CkB	Chetek sandy loam, 1 to 6 percent slopes	18	IIIe-3	63	3d1	4	3	2
CkC2	Chetek sandy loam, 6 to 12 percent slopes, eroded	18	IVe-3	65	3d1	4	3	2
CkD2	Chetek sandy loam, 12 to 20 percent slopes, eroded	18	VIe-3	68	3d2	4	3	2
Cu	Curran silt loam	19	IIw-2	61	3o2	6	5	3
DaA	Dakota loam, 0 to 3 percent slopes	20	IIs-1	62	Not placed	5	1	1
De	Dells silt loam	20	IIw-5	62	3o2	6	5	3
DuA	Dunnville sandy loam, 0 to 3 percent slopes	21	IIIs-4	64	3o1	1	2	2
ElB	Eleva sandy loam, 2 to 6 percent slopes	22	IIIs-4	64	3o1	1	2	2
ElC2	Eleva sandy loam, 6 to 12 percent slopes, eroded	22	IIIe-7	63	3o1	1	2	2
ElD2	Eleva sandy loam, 12 to 20 percent slopes, eroded	22	IVe-7	66	3r1	1	2	2
EmB	Elkmound loam, 2 to 6 percent slopes	22	IIIe-3	63	3d1	4	3	2
EmC2	Elkmound loam, 6 to 12 percent slopes, eroded	23	IVe-3	65	3d1	4	3	2

Map symbol	Mapping unit	Page	Capability unit		Woodland suitability group	Wildlife group	Recreation group	Tree and shrub group
			Symbol	Page	Number	Number	Number	Number
EmD2	Elkmound loam, 12 to 20 percent slopes, eroded	23	VIe-3	68	3d2	4	3	2

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Page	Capability unit		Woodland suitability group	Wildlife group	Recreation group	Tree and shrub group
			Symbol	Page	Number	Number	Number	Number
LuC	Ludington and Humbird soils, 6 to 12 percent slopes	36	IVe-3	65	3s1	1	2	2
Ma	Markey muck	36	IVw-7	66	3w3	8	8	4
Mc	Marshan loam	37	IIw-5	62	4w2	7	6	3
MdB	Menahga sand, 1 to 6 percent slopes	38	VIIs-9	68	3s1	3	4	2
MdC	Menahga sand, 6 to 12 percent slopes	38	VIIs-9	68	3s1	3	4	2
MeA	Meridian loam, 0 to 2 percent slopes	39	IIs-1	62	2o1	1	1	1
MeB	Meridian loam, 2 to 6 percent slopes	39	IIe-2	60	2o1	1	1	1
MeC2	Meridian loam, 6 to 12 percent slopes, eroded	39	IIIe-2	63	2o1	1	1	1
MmA	Meridian loam, moderately well drained, 0 to 3 percent slopes	39	IIs-1	62	2o1	1	1	1
Mo	Morocco loamy sand	40	IVw-5	66	3s2	6	5	3
MrB	Mt. Carroll silt loam, 2 to 6 percent slopes	41	IIe-1	60	2o1	1	1	1
MrC2	Mt. Carroll silt loam, 6 to 12 percent slopes, eroded	41	IIIe-1	62	2o1	1	1	1
Ms	Mt. Carroll silt loam, benches	41	I-1	60	2o1	1	1	1
Na	Newson loamy sand	42	IVw-5	66	4w1	7	6	3
NrC2	Norden silt loam, 6 to 12 percent slopes, eroded	43	IIIe-2	63	2o1	1	1	1
NrD2	Norden silt loam, 12 to 20 percent slopes, eroded	43	IVe-2	65	2r1	1	1	1
NrE3	Norden silt loam, 20 to 30 percent							

Map symbol	Mapping unit	Page	Capability unit: Symbol	Capability unit: Page	Woodland suitability group: Number	Wildlife group: Number	Recreation group: Number	Tree and shrub group: Number
PlB	Plainfield loamy sand, loamy substratum, 1 to 6 percent slopes	49	IVs-3	67	3o1	3	4	2
P1C2	Plainfield loamy sand, loamy substratum, 6 to 12 percent slopes, eroded	50	IVs-3	67	3o1	3	4	2
Re	Riverwash	50	VIIIs-10	69	6s1	10	7	2
SeB	Seaton silt loam, 2 to 6 percent slopes	51	IIe-1	60	1o1	1	1	1
SeC2	Seaton silt loam, 6 to 12 percent slopes, eroded	51	IIIe-1	62	1o1	1	1	1
SeD2	Seaton silt loam, 12 to 20 percent slopes, eroded	51	IVe-1	65	1r1	1	1	1
SeE2	Seaton silt loam, 20 to 30 percent slopes, eroded	51	VIe-1	67	1r1	1	1	1
SfB	Seaton silt loam, benches, 2 to 6 percent slopes	51	IIe-1	60	1o1	1	1	1
SmA	Seaton silt loam, moderately well drained, 0 to 2 percent slopes	51	I-1	60	1o1	1	1	1
SmB	Seaton silt loam, moderately well drained, 2 to 6 percent slopes	52	IIe-1	60	1o1	1	1	1
So	Shiffer loam	52	IIw-5	62	3o2	6	5	3
SpB	Sparta loamy sand, 1 to 6 percent slopes	53	IVs-3	67	3s1	3	4	2
TeA	Tell silt loam, 0 to 2 percent slopes	54	IIs-1	62	2o1	1	1	1
TeB	Tell silt loam, 2 to 6 percent slopes	54	IIe-2	60	2o1	1	1	1
[illegible]	[illegible]	54	VIIs-9	68	4s2	3	4	2

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